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THE ETIOLOGY OF FRACTURES OF THE CRANIAL BASE, AND THE ANATOMICO-PATHOLOGICAL REASONS FOR THEIR FATALITY.

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GENTLEMEN,—When asked to prepare a paper for this evening, I felt how utterly inadequate was the time which remained before the 23d of September, in which to write one worthy your consideration. As one of the authors of the amendment to the constitution whereby the conversational meetings were inaugurated, I felt, however, that it would ill befit me to refuse to fill the gap left by the declination of one so much better fitted for the task as my friend Dr. J. Ashhurst.

Upon due reflection, the subject with which I propose to occupy your attention this evening has seemed eminently fitting for the purpose, and for the following reasons. Although, of course, to some the views I intend advancing are neither altogether new nor original, yet, to judge by the literature of the subject, few practically realize their importance.

Let it be clearly understood that the major part, if not all, of what I propose saying is not original; but, owing to the seeming ignorance of most writers upon the subject, the old views need re-stating. The ordinary view held, and, judging from the results, taught, is that these injuries are so grave from the amount of violence causing them, or from the important vital structures contiguous to the injured bones and liable to similar traumatic lesions. Now, I would state, at the outset, that I consider this view to be very incorrect, and that could we change the structure of the skull so as to render its *base* like its *vault*, extensive shatterings could not occur; or, if they did, no more evil results would follow than in an ordinary fracture of the vault. When my explanations are given, this apparently bold statement will appear, I trust, justified; although, strictly speaking, it is only approximately correct. It is, however, sufficiently accurate for the sake of impressing what I believe to be an important fact.

Of course it will be understood that I do not deny that death is the direct result of basal injuries when they are such complete crushes as to divide the brain-case into several distinct segments, with extensive lacerations of the brain-substance. Perhaps the clearest way to explain my views will be to take a case such as I have seen myself, or such as Hilton relates, as a text.

First, however, let us classify the various basal fractures, and then define clearly which are dealt with in this paper. First, then, we have fractures of the base resulting from direct violence, such as a thrust from a cane or umbrella in the orbit. A violent blow on the nose, which fractures its bones, may also break the cribriform plate of the ethmoid, as in these specimens which I show you. Then, too, the condyles of the lower jaw have been driven through the glenoid fossa of the temporal bone by direct violence applied to the former. Besides such instances of direct violence, there are others where I maintain that it is in reality the fracturing force. I suppose that many will take exception to this statement: still, it is true, and is constantly taught, although not formulated as I have done. Suppose a man falls from a great height upon his feet, what results? Why, practically, the condyles of his occipital bone are struck violently through the medium of the spinal column,—more violently, indeed, than otherwise could occur, because plus all the amount of the vibrating structures of the body, except such as are diverted or checked by the various tutamina, struck just as *directly* for mechanical purposes as if with a sledge-hammer.

Again, if a man falls from a height and strikes full upon the vault in some comparatively yielding substance, as soft earth, the weight of the body again strikes, through the medium of the spine, a violent blow upon the occipital condyles, thus fracturing them. This statement of such injuries being due to direct force may appear clearer if I say that a blow is merely the exciter of vibrations, and that we must consider the point whence they start as in reality the *point of impact.*

Then, again, a third class present themselves, where the fissure starts in the vault and merely reaches the base by direct continuity. The head may be also caught between two opposing forces, when a general crush involving the base will ensue. Finally, we have those said to be produced by *contre-coup*. If we mean by this a fracture upon the side opposite to the point struck, unless this point be about the centre of the vault, this certainly is unlikely. For instance, a violent blow upon the right parietal boss will not produce a fracture at the left parietal eminence, but at the base of the cranium, through one or both petrous bones. I do not deny that a blow in this situation may produce laceration of the brain-substance exactly opposite to the point struck, because the brain is practically homogeneous, and vibrations *cæteris paribus* are conveyed through it equally, while the skull *does not* convey vibrations equally well in all directions. Again, the statement that the vibrations which are excited in the vault travel by the shortest route to the base is absolutely incorrect. They reach the base by the "shortest anatomical route," indeed, but that is very different from the shortest route, and is often quite a long one. Again, the statement made by a recent author that a blow upon the occiput may break the petrous portion of the temporal bones, because the "basilar process rests against the apices of these petrous bones," is a mistake, as the force which breaks these bones does not reach them through the basilar process, but the vibrations pursue another course, as will be presently explained.

The mistake here made is in failing to remember that the various portions of the skull are of varying thicknesses and are so constructed for specific ends. If the vault were of even thickness and density, as well as all of the base except its central portion, and if the skull were also a true sphere, *then* true fracture by *contre-coup* of the base would obtain, for the vibrations would travel from the point struck equally in all directions until, meeting at the weak central basal portion, it would be disrupted. But the skull is of unequal thickness, it is not a sphere, and certain portions of its base, although frequently broken, are in reality the densest and strongest.

It is unquestionably true that the portion of the skull struck determines which of the fossæ of the cranial base the fracture will traverse. This I hope to explain by certain anatomical peculiarities of the skull-structure. This fact relative to the point struck determining the site of the fracture, has been proved by the experiments of Aran and the investigations of Prescott Hewett.

Some writers have been so hard pushed to explain fractures at a distance from the part struck, that they have actually ascribed them to the vibrations communicated to the *brain*, which then acts as the fracturing force. Thus, Prof. Longmore considers that certain fractures of the orbital plates of the frontal bone, caused by gunshot wounds of distant parts of the skull, are actually produced by the vibrations of the brain. In this view Otis concurs. Dr. Harrison Allen, in an article on fractures of the cranium, in Hays's *American Journal of the Medical Sciences* for January, 1874, gives an explanation of such cases, instancing that of President Lincoln. I regret to feel compelled to dissent from his conclusions. In the proper place the case will be related, with Dr. Allen's comments upon it, and my own reasons for dissent.

Before proceeding to the anatomical demonstrations which I wish to make, let me refresh your memory by a homely illustration as to the direct proportion of the force of vibrations to the amount of the bony or other tissue struck. If one end of a wire of fine calibre be held in the hand, and the other, after being laid upon an anvil, be struck never so hard, no appreciable vibrations will be perceived; yet they are present. Let the same experiment be tried with a crow-bar, and I think few of us would care to suffer the unpleasant jar that would result. Now, just this same thing occurs in the skull: where thin the vibrations are imperceptible, where thick they are marked. But the base of the skull, having to support the superincumbent weight of the skull and brain and afford a firm basis for the movements of the lower jaw and of the head on the spine, as well as to protect the important nervous structures connected with it, must be massive, at least in parts. These advantages during health have compensating disadvantages when man is subjected to violence: indeed, in his ordinary movements this massiveness of portions of his cranial base would be very disad-

vantageous were it not for certain wise provisions presently to be spoken of. It is hardly necessary for me to refer to the ordinary tutamina of the brain, such as the hair, scalp, pericranium, and dura mater, acting, as the latter two do, as a wash-leather lining and cover would to a bell. It will, however, be essential to speak of certain processes of the dura mater.

I will now give briefly a history of a case of fracture of the base, which I propose to use as my text, in conjunction with the general relation of similar cases given by Mr. Hilton in his remarkable lectures upon the cranium. My friend Dr. Charles Wirgman called upon me one evening some months back, requesting me to see in consultation with him a young boy of some nine to ten years, who, he thought, was suffering from a fracture of the skull. I am indebted to Dr. Wirgman for the following outlines of the case. Four days previously he had been desired to see the patient, who had walked home, assisted by his playmates, after having fallen on his head while playing leap-frog. When Dr. Wirgman saw him, he was suffering from slight symptoms of concussion, the exact details of which are of no moment. The following day he seemed better, only complaining of some headache. Upon the third day the improvement was *very* marked, nothing remaining but some headache. He was very desirous of being allowed to sit at the window, and I know that the doctor's injunctions as to perfect quietude were not complied with. The patient, when called upon to evacuate his bowels, went out as a matter of course to the yard, and walked about the apartment when so inclined. Only a few hours after Dr. Wirgman's last visit he was hastily summoned; but before going he called upon me to request my advice and assistance. The patient's residence was at a short distance, but when we arrived he had been dead some little time. He had been—as far as could be ascertained—attacked with vomiting, which was followed by eclampsia, rapidly terminating life. I expressed the opinion that the patient had had a fracture of the base of the cranium, and that perfect quietude might possibly have averted the fatal results. By the courtesy of Dr. Wirgman and Dr. Lee, the then coroner's surgeon, I was present at the autopsy. An insignificant ecchymosis was detected over the right mastoid region, which, it is probable, resulted from infiltration of blood from the fracture. Upon reflecting the skin, what at first sight looked merely like the normal masto-occipital suture, with a little coagulated blood occupying its depressions, was seen. Upon a closer scrutiny this proved to be a fracture separating the synarthrosis. The test upon which I relied was the impossibility of removing the line of coagulated blood effused between the fragments, while the same collected in a suture can always be wiped or washed away. Upon removing the calvarium, a line of fracture was discovered which traversed the right petrous bone, extending posteriorly from the occipito-mastoid suture forward. A small blood-clot of a few lines in extent lay near the fracture, but there was nothing that could be called meningitis: indeed, the brain and its membranes were unusually healthy-looking.

Hilton makes the following pertinent remarks, which I transcribe verbatim:

"I have known it to happen that a person, having been exposed to external violence, which has led to a fracture of the base of the skull, and feeling pretty well a few days after the accident, has expressed a desire to get up and leave his sick-chamber, which his medical attendant has been indiscreet enough to allow him to do, or which he has done of his own accord, without the knowledge or consent of his medical adviser. After moving and walking about, however, for a short time, he has soon complained of headache, has been attacked with sickness and vomiting, afterwards has had confusion of his ideas, and, finally, has fallen into a state of unconsciousness, in which, after three or four days, he has expired."

The first point of mechanical interest in the structure of the brain-case is its ovoid form, to which is ascribed a large proportion of the security of the brain. To a considerable extent this is true; but it is a matter of profound surprise to me how one important point is apparently completely overlooked. Take up any work upon anatomy, and the author will doubtless expatiate upon the strength secured by the peculiar form of the brain-case, any segment being a section of a spheroid. If an injury—as a fracture—were only produced by a *crushing* force, this would be an incontrovertible proposition; if, upon the other hand, a large

part of the damage is done by setting up *vibrations* in the bones themselves, then the form of the skull only conduces in a slight degree to its immunity from fracture. An arch that will sustain uninjured hundreds of tons' *pressure*, if vibrations are set up in it, may be readily *fissured* in many directions, although its *form* may remain unchanged. The arched form of the skull, then, merely resists the tendency of the bones to be pressed inward when a blow is struck; after that the fracturing force expends itself in producing vibrations, which cause the fracture. Any brittle body capable of fracture will be so injured whenever the *vibrations become violent enough to overcome the cohesion between the particles composing that body.*

Let us first examine the anatomy of the child's skull, as it may give us some hints which will prove useful. I suppose that I may safely say that the base of a *young* child's skull has never been fractured by anything but direct force, or that more than *one* bone of the vault has ever been broken unless the force was actually applied to it. Now, why is this so? Examine an infant's skull, and you will see that each bone is isolated from every other by membrane,—than which there is no better arrester of vibrations. Again, as you will readily see by a careful examination of any young parietal or frontal bone, but specially of one say at the sixteenth week *in utero*, the most projecting portions (those, of course, which are most apt to strike the ground first in a fall) are the thickest, while extending from these centres are radii of bone becoming more and more delicate. Each of the fine terminal points of these radii is enveloped by the membrane, which, by its ossification, forms the bone. Recall now my homely illustration of the vibrations of the wire and the crow-bar. Do you not see that the vibrations start in the denser bone, but, being conducted on, are propagated by thinner and thinner bone (*i.e.*, a structure less and less capable of vibrating strongly), until they are finally safely conducted off to the terminal radii of the bone, which are *completely enveloped in membrane*, and are thus totally arrested? By this you can readily see that the injury inflicted upon one bone of an infant's head by a blow never passes beyond the one bone struck.

These efficient means for the arrest of vibrations explain the immunity from injury enjoyed by infants and children, where, considering the strength of their skulls, the injuries they receive with impunity are otherwise inexplicable. This is, indeed, fortunate, when we consider how "mobile" is the nervous system of the infant, and how seriously injuries of it are resented.

What, therefore, should we learn from this? That one of the most efficient means for arresting vibration in bone is to have it enveloped closely by a membranous tissue.

Turning to the adult skull, I would call your attention to the following points. The projecting parietal bosses, with the frontal eminences, are not so prominent, and, instead of being the thickest portions of the vault, they are often the thinnest. The eight component bones of the brain-case are more or less co-ossified, and are in bony contact. Let us remove the calvarium of both the infant and the adult. In the infant the various bony projections are certainly present, but the brain looks as if it would fit fairly. The base of the adult's skull looks as if nothing could be better fitted to lacerate the delicate brain, and is not at all correspondent in form. Here in front are the projecting anterior clinoids, there behind the posterior projections of the same name; here is a deep depression, there an elevation. If a cast of the base of the brain were taken, it would plainly show that there exists but little correspondence between this portion of the case and its contents. A blow on this practically solid ovoid of bone formed by the skull will infallibly set up vibrations, which will pass in any and every direction. Here is an organ of delicate structure which apparently has to lie upon a rugged and uneven bed. The ordinary motions of walking, much more those of running or jumping, would apparently imperil the integrity of the vital nerve-centres. What, then, upon the whole, renders the brain the best-protected organ in the body? Again let me say that the hair, scalp, etc., are excluded from consideration as tutamina in our present remarks.

The mechanical effect of the diploë, however, must not be ignored, especially in view of some statements with regard to it made by Dr. Allen in the paper already cited. In the first place, he denied the correctness of the usual descriptions of

there being two tables of compact tissue in the skull. On the contrary, he maintains that there is but one, viz., the internal, and that the so-called external table is only modified cancellous tissue.

I cannot agree with him, for, call it what you may, it is still a much more compact, dense structure than the subjacent diploë, and as such a vastly better conductor of vibrations. On the other hand, I entirely agree with him in thinking that the inner is the best and principal conductor of vibrations. Again, Dr. Allen cites the easily demonstrable fact that there is an actual absence of the diploë in certain portions of several of the cranial bones. The sites specially to be noted where this important element is absent are the cerebellar fossæ, the roof of the glenoid fossa, the greater part of the squamous plate of the temporal bone, the orbital plates of the frontal, and the floor of the lateral sinuses, as they approach the base of the brain. Here also my views clash with those of the author cited. He says that in these situations the internal and external tables are in contact, or, more correctly, that *both* diploë *and* external tables are absent. The importance of this will appear when he goes on to say that a blow struck upon any portion of the skull, if not of sufficient violence to pass the damper of the diploë to the internal table, is conducted to more distant points along the diploë itself, not by the external table, which he maintains does not exist. For me, however, it does exist, and is of great importance, for the following reasons. By Dr. Allen's explanation, both in injury and in the ordinary normal movements the slighter vibrations are confined to the diploë, while the more violent simply do damage by affecting the vitreous table despite the diploë and plus whatever vibrations may be present in the latter. I, however, would liken the two tables to two insulated wires, the insulating medium being the diploë. As long as the diploë is present, either of the two tables may vibrate separately, or both in differing degrees. At those places, however, where the diploë is absent, the two conductors of vibrations are in contact and the circuit is completed, the spark leaps across, and we have a shock; *i.e.*, to return from illustration to fact, the vibrations of differing intensity meet, and a fracture takes place, subject to certain modifying influences next to be referred to.

To return to our question, What renders the brain the best-protected organ of the body? This was when speaking of the apparent want of adaptation between the base of the brain and of the brain-case. The answer is, these very irregularities and projections, which seem fitted only to lacerate the delicate structures lying superimposed. Just where the greatest dissimilarity exists between the brain and its case, viz., in the central portion, in the normal state, the brain is distinctly lifted off from the bones by a stratum of fluid,—the cerebro-spinal fluid,—which serves, as Mr. Hilton points out, as a "water-bed." By means of this the cerebellum does not come into contact even with the posterior cerebral fossa, and the central portions of the cerebrum are held off at a distinct interval from the bones. Some such provision is absolutely necessary for the ordinary normal movements to proceed in safety. Without something similar, even walking—much more running and jumping—would inevitably result in fatal laceration of the brain-pulp. But its usefulness does not end here. What better means of arresting vibrations originating in the bony parietes which might otherwise prove prejudicial to the brain? Surely, nothing.*

Let me pass around this specimen of the base of the skull with its calvarium. By holding it up to the light you will see that there are certain thin portions mapped out by certain thicker ridges. This will be clear from the different transmission of the rays of light. These thicker portions, in general terms, converge towards the petrous portions of the temporal bone, the anterior and posterior clinoid processes, and the crista-galli of the ethmoid. Examine now with me the anatomical peculiarities of the parts mentioned. The anterior clinoids are surrounded by dura mater, and are immersed in the cerebro-spinal fluid. The same description will answer for the posterior clinoids. The apex of the petrous portion of the temporal bones, and a portion of their inner margins, seem, the former in contact with the sphenoidal body, the latter with the basilar process of the occipital bone. In reality, the apex of the petrous bone is separated from the body of the sphenoid by the plate of cartilaginous tissue filling the foramen lacerum medius, while the inferior petrosal sinus lies in a groove

* Of course the vibrations which meet at the base of the skull may neutralize one another.

formed partly by the petrous and partly by the basilar process of the occipital bone. Finally, the crista-galli is the point of attachment of the falx cerebri, in the commencement of which it is embedded. Let the skull now be set in vibration by a blow, and, instead of reaching the base by the "nearest" route, the vibrations will follow the nearest one, or *all*, of these *anatomical* routes.

I think, then, that I have demonstrated that these apparently useless and dangerous projections have a useful purpose, for each serves as the terminal discharge-point for the accumulated vibrations which *must* follow, by virtue of mechanical laws, the best *conductors*, viz., the densest portions of the bone,* which have been all stated to converge to the points mentioned. These points are provided with such efficient dampers of vibrations that all the ordinary and many of the extraordinary vibrations are rendered innocuous. Indeed, had this properly come within the scope of my paper, I think I could demonstrate that the ordinary vibrations are positively put to a physiological use.

Let me now apply the knowledge gained from these anatomical studies to the question of fracture of the cranial base.

The statement, then, made by Aran and others—that fracture of the base is invariably accompanied by a fissure of the vault, which in reality is the starting-point of the fracture—is, I think, incorrect, from the foregoing facts as to the conduction of vibrations, even if we exclude these specimens and the case I have related. If Aran's view were correct, the greatest force being applied at the weakest portion of the skull, viz., the vault, the fissures should be widest apart at that point, becoming smaller and less widely separated as they reach the denser and stronger positions of such bones as the petrous; but the reverse obtains. In proof of my statement, examine this skull. Again, the case taken as my text and the two specimens that I show you here, besides other recorded cases, show that in the slighter cases of fracture of the base the vault is not fissured. Now, if fracture of the base does occur in these cases without fissure of the vault, severer ones, where the vault is so injured, I consider, can be caused in the same way; but, the force exerted being greater, the fissures starting at the base simply extend farther, and thus implicate the vault. The separation of the masto-occipital suture in the three cases cited—mine and these two in the Mütter Museum—seems to give the key to the mechanism of the severer fractures. It would be impossible to produce this effect if the fracture started at the vault, unless the upper continuation of the same suture were separated, and that, too, more widely than below. Presenting the appearances seen, the injury must have been produced by a spreading force acting somewhat in the way moistened beans do in separating a skull. If the fracture of the base started in the vault, the suture could be separated only by fracturing it so as to drive one bone below the level of the other; but this is *not* the appearance found. If, on the other hand, it commences at the base, the vibrations fracture it, and, displacing the bones, the lower part of the masto-occipital suture would be—as it is—*forced apart from within.* This is clearly the case in the specimens that I show you, and in the case related. I believe that this is *always* so, and that the appearance in the three cases cited is the key to the whole subject.

By examining the phenomena presented by contusions of the brain, an additional proof will be found of this conduction of vibrations to the points mentioned. Prescott Hewett states that the *under* surface of the cerebellum is the part of that organ most frequently contused; that the posterior lobes of the cerebrum, resting, as they do, upon the tentorium, are but seldom injured; that the anterior lobes are more frequently so; but that the middle lobes are vastly more frequently contused. He explains these facts by the relative frequency of fractures in the various regions and the numerous sharp, irregular projections of the cranial base, "which, although rounded off to a certain extent, and smoothed down by the dura mater, are still both sharp and numerous." Now, as contusion is frequently found in various portions of the brain *without any fracture*, and as even in fracture of the base the fragments themselves do not usually injure the brain, the only explanation left is to consider them as largely due to the conduction to that point of powerful vibrations. As to the statements concerning the sharp points, etc., I can only refute them by again calling your attention to

* The dense ridges of bone described are also actually amplifiers of vibrations.

the actual preparations before you, together with the position of the cerebro-spinal fluid. How Mr. Hewett and M. Fano can make such statements after examining a skull in the fresh state passes my comprehension. They have eminent authority, however, to fall back upon, whose want of observation still more surprises me,—viz., Sir Benjamin Brodie, who says, "The great irregularities which exist on the inner surface of the basis of the cranium sufficiently explain wherefore the inferior is more liable to be ruptured than the superior surface of the brain." Mr. Hewett adds, "And nothing could be more explicit." It is only *explicable* to me by supposing that they examined—as is much too customary—only the *dried*, not the fresh, skull.

Let us examine President Lincoln's case, similar ones to which are explained by Longmore in the following manner: The lesions are to be ascribed to a "transmitted undulatory stroke or sudden impulse of the brain-substance itself against the thin bony layers constituting the orbitar plates. I am in possession . . . of the notes of a case in which a similar fracture took place in one orbitar plate, from a ball passing along only grooving the upper surface of the hemisphere lying over the plate broken." Dr. Otis, as before said, accepts Prof. Longmore's opinion as being more satisfactory "than the hypothesis that the fracture was produced by *contre-coup*. The unusually thin orbital plates on either side were exposed to the impulse of the cerebral pulp. Even if they were not fully protected from the vibrations in the vault of the cranium by the dense supra-orbital ridges, it might be inferred that the force would be transmitted mainly to the right orbital region, or that opposite the entrance-perforation, whereas *both* orbital plates were fractured."

Dr. Allen also quotes Prof. Longmore's reasons for thinking that the shock could not be transmitted along the cranial walls to "the expanse of the frontal bone itself and the several processes within which the orbital plates are held, and by which they are so strongly protected in all directions laterally." As I have just said, my study of the cranium leads me to a very different conclusion with regard to Lincoln's fractured base from that of Dr. Allen. Let me quote his own words: "Now, in the case of President Lincoln, the ball, not expending its force about the wound of entrance, yielded the greater part to both tables of the cranium. The outer diploic layer appropriated the vibrations, and transmitted them to the great wings of the sphenoid bone, and thence to the axis of the cranium, without injury to the skull. The inner plate, not having any means of diverting its burden of force, carried it forward in two different lines from the wound of entrance to the orbital plates (which lie, as is known, about on a level with the upper margin of the tentorium), and broke them. It is to be inferred that, had the ball entered either above or below this line, the conduction of waves towards the forehead would have been greatly modified." How it is possible for the orbital plates to be protected from vibrations by the "dense supra-orbital ridges" I cannot see, nor why the "right orbital plate" should be more likely to be broken, except upon the old exploded theory of *contre-coup*, is not plain. Again, Prof. Longmore, with Dr. Otis, seems to misapprehend a most important mechanical fact. If the force which breaks the orbital plates be of the nature of a something from without, entering between the particles of the bone and pressing them asunder, *then* the "expanse of the frontal bone," the "several processes within which the orbital plates are held, and by which they are so strongly protected in all directions laterally," and the "dense supra-orbital ridges," might perhaps avail. The truth is, however, that it is the vibrations of the bone itself which become so marked as to overcome the cohesion between its particles, and some, if not all, of the same dense bony ridges are the means by which these disrupting waves reach the orbital plates.

It is stating a mechanical impossibility to say that the vibrations were carried "forward in two different lines." As well might one expect a pebble thrown into water to send ripples in but two directions. The truth is, that the ball, entering one inch to the left of the median line, just above the left horizontal arm of the occipital cross, started vibrations which passed in *every* direction. If, however, the views are correct which I have just explained, the vibrations soon met with the thickened margins of the groove for the superior longitudinal sinus, which, being the best conductor and reinforcer of them, carried them to the frontal bone and crista-galli. The usual damper of vibrations here was

insufficient, and, they being propagated through the anterior fossa, the weaker parts of the latter gave way. Doubtless, too, vibrations reached the orbital plates through the lesser wings of the sphenoid, and were coefficient in producing the fracture. On the other hand, those passing downward were safely conducted off by the means already indicated when speaking of the course of the vibrations.

A valuable fact pointed out by Prof. Allen is, that the occipital condyles really consist of two facets, often entirely separated from each other by a distinct groove, and he points out how if, at the time of force being applied, say from a fall on the feet, the head be extended, the force will affect chiefly the posterior facets, while if the head be flexed the anterior ones will have to bear the brunt. This probably explains, always subject to the laws of conduction of vibrations, why in one case a fall on the feet produces a fracture of the anterior, and in another a fissuring of the posterior fossa.

Finally, we come to the reasons for the fatality of basal fractures. Of course, in the extensive tremendous crushes frequently found no explanation is needed. But recall to mind the cases I have related where the injury was so slight as almost to produce no symptoms at first; where the contusion of brain-substance, if such existed, was at a minimum; where, in my own case, no inflammatory symptoms were present. Here, clearly, some explanation is demanded. As long as such patients are quiet, as long as no vibrations are excited by the movement of locomotion, just so long the brain-substance contiguous to the lines of fracture remains uninjured. The primary jarring and slight contusion are recovered from; and, should quiet be sufficiently long maintained, recovery ensues. Let, however, the patient, tempted by his apparent recovery, leave his bed, immediately the normal vibrations which must mechanically arise are excited, and what follows? Before, in a state of health, they were safely conducted to points where they were annihilated; but now their course is interrupted by the fissures, and the superimposed brain-substance is jarred and probably slightly lacerated. From such constantly-recurring injuries, slight though they be, results, in the adult, meningitis or encephalitis, in the child, as in my case, very probably eclampsia, due to the greater excitability of the young brain. In proof of these slighter injuries induced by the slighter vibrations, let me again refer to the severer ones seen in extensive shattering of the base. As I then said, upon anatomical grounds, those found in the cerebellum and middle lobes of the brain cannot be produced to any great degree by direct injury from the fragments, but result from the tremendous vibrations conveyed to the brain when the bones gave way.

It must now be clear that the anatomical facts demonstrated show: 1. That vibrations originated at any part of the skull do *not* pursue the most direct course, although they *do* follow the most direct anatomical route, to the base of the skull,—some, indeed, following all the anatomical courses, but the more distant more feebly, owing to the damping effect of the diploë and other tutamina of the brain. 2. That the means for rendering innocuous the ordinary jars of normal motions and many of the accidental blows, when the force applied is excessive, tend to the destruction of certain parts. 3. That fractures of the base much more commonly than is usually taught nowadays start *from* the base and extend thence into the vault. 4. That, when the normal route of the vibrations is interrupted by a fissure, those produced by ordinary normal movement, then being prevented from terminating in their proper dampers, injuriously affect—perhaps even slightly lacerate—the brain-substance, and thus largely account for the greater fatality of such injuries over those of the vault. 5. That these facts should impress us with the necessity for the most rigid enforcement of quiet in cases where we suspect or are certain of a fractured base, where quietude must be maintained for a lengthened period.

TUBERCULOUS LARYNGITIS.—When there are great pain and dysphagia, the following mixture, applied with a laryngeal brush, is recommended by Dr. E. Fletcher Ingalls. The relief produced by the application of this has given more satisfaction, says Dr. Ingalls, than anything else in the course of his professional life:

℞ Morphiæ sulph., gr. iv;
Tannin, gr. xxx;
Acid. carbolic., gr. xx;
Glycerin., ℥j.—M.

New York Medical Record.

HEMORRHAGE INTO THE BASAL GANGLIA, FOLLOWED BY EFFUSION OF BLOOD INTO AND BEYOND THE VENTRICLES, SYMPTOMS AND LESIONS OF APOPLECTIC SHOCK, CHEYNE-STOKES RESPIRATION, HIGH HEAD-TEMPERATURE, ETC.

Read before the Philadelphia County Medical Society, September 22, 1880,

BY CHARLES K. MILLS, M.D.,

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G. H., aged 62 years, while eating his dinner, suddenly fell unconscious. For several months before he had at times complained of dizziness and queer feelings in his head. His radial and other vessels were hard, and evidently the seat of degenerative change. When first seen by Drs. Allison and Gibb, two of my internes at the Philadelphia Hospital, a few minutes after the attack, he was profoundly unconscious, his breathing being puffing.

At this time marked right-sided paralysis was present. In the face, both the upper and lower fibres of the facial were involved; the eye remained partly open, and the mouth was pulled decidedly to the left. The right arm and leg were also powerless.

The patient was seen by me two hours after the onset of the attack. He was lying on his back, unconscious. The loudest shouts had not the slightest arousing effect. His face was pale. His left eye remained closed, but the eyelids of the right side did not come quite together. The pupils were equal; they were sluggish, but neither dilated nor contracted. Conjugate deviation of the eyes was not present; his eyes were directed straight forward. On irritating the conjunctivæ, a good reflex response was elicited. The mouth was drawn very slightly to the left,—so little that it needed careful observation to determine the fact. The right nostril was more dilated than the left. As far as general appearances went, little difference in the paralytic condition could be made out between the limbs of the right and left side: close examination, however, showed a more profound paralysis of the right arm and leg than of the left extremities; he occasionally moved the left arm and leg. A slight tendency to flexion was also present at the right elbow, in the fingers of the right hand, and at the right knee. This was not noticeable on the left side. While dictating notes upon the case, I observed a slight movement of flexion in the middle finger of the right hand, and a tremulous muscular wave in the corresponding metacarpal region. This was followed by a twisting or rotating motion of the forearm, from the position of supination towards that of pronaotin. These movements were repeated three times in the course of a few minutes; and then an exactly similar tremulous and spasmodic action was gone through with by the finger, hand, forearm, and arm on the left side. Still later the same took place on both sides simultaneously. The right great toe also twitched upward and downward at intervals of a few minutes.

Efforts were made to test for sensibility, but without result. He was totally unconscious of external impressions. Reflexes, however, were marked. The plantar reflex on the right side was good, and on the left it was decidedly exaggerated. Skin reflexes in the thighs, abdomen, chest, and arms were also examined for, and with the same result,—namely, the determination of good reflex response everywhere, and for the regions of the left half of the body not only good, but exaggerated. I did not examine for patellar reflexes, as I did not wish to move the patient any more than could be helped. The reflexes from the triceps brachialis of each side were marked.

Examination of the right radial pulse showed eighty-eight beats to the minute; of the left radial, ninety-two. The character of the pulse on the two sides differed markedly: on the right it was comparatively full and strong; on the left it was frequent, feeble, and irregular. The temperature taken in the right axilla was 99.1° F., in the left it was 99.2° F.

The respirations were forty-four to the minute when first counted. Noticing that at intervals he stopped breathing, with my resident physicians I carefully watched the process of respiration for more than half an hour. He would breathe with a little noise, but steadily, for from four to five minutes, and then, either with a long-drawn sigh, or with a struggling sound in the throat, he would cease breathing entirely, the period of complete suspension lasting from one-eighth to one-fourth of a minute. At the end of this period of apnœa, respiration would begin, at first feebly, but gradually becoming stronger. At the expiration of from four to five minutes the gap in breathing would recur. In this way his respiration continued, with alternations of breathing and apnœa. During the hiatus in respiration the pulse at the wrist became slower, fuller, and firmer. The heart-action was more labored. The face did not change in color or appearance, remaining pale and expressionless.

A drop of croton oil in castor oil was administered, the patient swallowing the dose with but little difficulty. Warming-pans were applied to his feet. He was ordered to be kept perfectly quiet, and milk in small quantities was directed to be given at intervals, if possible. A prescription containing potassium bromide and tincture of aconite was also ordered.

The stroke occurred at 11 A.M. He was

seen by me, and the above points noted, from 2 to 3 P.M. From 3 o'clock until he died, at 11.15 P.M., Drs. Allison and Gibb were in almost constant attendance upon him. The paralysis of limbs and face became absolutely general. The pupils became more dilated, and the face paler. The surface of the body was bathed in perspiration. The slight spasmodic movements in the upper extremities ceased during the afternoon. His urine, which dribbled from him, was removed by the catheter. Subsequent examination of it showed no albumen. No passage from the bowels took place. The heart-action and pulse became more rapid and feeble. At 6 P.M. the temperature taken in the right axilla was 100.8° F., in the left it was 101.2° F. The surface-temperature of the head at two points was carefully taken with a modified Seguin thermometer, at 7 P.M. The points selected for observation were one on the right side of the head, and the other on the left, about the middle of the "line of Rolando,"—that is, the line on the outside of the skull determined by measurements to correspond to the fissure of Rolando within. The patient being bald, the observations were more easily made and more likely to be accurate than if the hair had been in the way. The right Rolandic station gave a temperature of 102° F., the left only 98.5°. The axillary temperature was taken again at 10 P.M.: for the right axilla it was 101.2°, for the left it was 101°. The Cheyne-Stokes type of respiration continued until 9 P.M., when it gave place to rapid and shallow but interrupted breathing.

A post-mortem examination of the brain was made thirteen hours after death. On removing the skull-cap, a large quantity of blood poured out. The blood which escaped during the entire autopsy was collected, and amounted to fifteen fluidounces. Neither the skull nor the dura mater presented any abnormal appearances. The pia mater of the convex and median surfaces of the left hemisphere was intensely hyperæmic, except at its extreme anterior end. A large ecchymotic area more than two inches in diameter was present beneath the pia mater over the posterior extremities of the superior and inferior parietal convolutions and adjoining anterior margin of the occipital lobe. A deeper zone of congestion, with slight ecchymosis, was also to be seen at the middle Rolandic region. The pia mater of the convexity of the right hemisphere presented nothing unusual except marked hyperæmia over the lower two-thirds of the ascending convolutions and the anterior end of the inferior parietal lobule. Stripping the pia mater, numerous slight hemorrhagic extravasations were found in the fissures and sulci, particularly in those of the right side. During the process of removal of the brain from the skull, large quantities of blood poured from a rent in the end lobule of the right occipital lobe. Resting the brain on its convex surface, large masses of dark blood could be seen occupying the central region of the base from the pons to the optic chiasm; the blood enveloped the cranial nerves in this area, and infiltrated the membranes and the spaces beneath them far out into the Sylvian fissures. The cerebellum, pons, and medulla oblongata were next examined, leaving the ganglia and white matter of the hemispheres to the last. Over the superior vermiform process of the cerebellum was a thick mass of clotted blood. Hemorrhagic foci were found here and there in the pia of the cerebellar hemispheres, the substance of which showed a few bloody points. The fourth ventricle was filled and distended with dark blood; its floor showed a very slight depression or splitting at its upper part; the aqueduct of Sylvius was greatly dilated. The lateral ventricles, which were entered from below, were filled with blood; their cornua were also enormously distended with blood. The septum lucidum, fornix, corpus callosum, and commissures were broken down, and the lateral and third ventricles had become one cavity engorged with blood. The ganglia and tracts of the right side were closely examined without finding any hemorrhagic centre. The anterior extremity of the left optic thalamus and the cue-portion of the caudate nucleus were broken through. The hemorrhage had apparently taken place either from one of the lenticulo-optic or one of the posterior internal optic arteries. The middle portion of the internal capsule and adjoining region of the lenticular nucleus, as well as the districts of the optic thalamus and caudate nucleus, to which I have referred, had been disintegrated by the extension of the hemorrhage. I determined positively by vertico-transverse sections that the anterior regions of the striate bodies and capsules, and the posterior portions of the optic thalamus, capsules, and lenticular nucleus, were not destroyed. The hemorrhage had evidently spread rapidly in all directions from its primitive centre internally, breaking through with great force into the lateral ventricle. Numerous miliary aneurisms were found along the course of the striated and other arteries. No softening of the convolutions, or lesions other than those described, were discovered. The post-mortem examination was limited to the brain and skull.

Remarks.—The different stages of paralysis shown by the case are explicable in the light of the post-mortem examination. The marked right hemiplegia present at first was due to the effect of the primitive hemorrhage upon the ganglia and motor tracts of the left hemisphere. When the brain-substance was torn through and the ventricles became filled with blood, press-

ure was exerted upon the tracts of both sides, and general paralysis supervened. Until late in the history of the case, however, close examination, as might be expected, revealed a more decided paralysis on the right side.

According to Bastian ("Paralysis from Brain Disease," p. 232), "in cases of ventricular hemorrhage we very frequently meet with tonic spasms of one, two, or more limbs; or tonic may alternate with clonic spasms in the same parts. In other instances we have a condition of rigidity in the limbs of one side, combined with clonic spasms in one or both extremities of the opposite side." The only spasmodic phenomena presented by the case here recorded were the slight tendency to flexion at the right elbow and knee, and in the fingers, and the movements of flexion in the fingers and of rotation of the forearm and arm, and the twitching of the right great toe. Marked rigidity or contracture was absent. It may be worth while considering whether the ecchymoses beneath the pia mater in the motor regions of the cortex may not have been the cause of these peculiar movements.

The exaggerated reflexes on the side of the lesion, and the marked differences between the right and left radial pulse, were points worthy of note.

The axillary temperature, unfortunately, was not taken until two hours after the occurrence of unconsciousness, when it showed 99.1° F. for the right axilla, and 99.2° for the left; at 6 P.M. it was 100.8° for the right, and 101.2° for the left; at 10 P.M., 101.2° and 101°. Supposing an initial lowering of temperature to have taken place before the first observations were made, the case would come under the second group of Bourneville, of cases terminating fatally in from one to two days, in which the temperature is primarily lowered and afterwards heightened.

The observations on surface-temperature were remarkable because of the high temperatures obtained and the great difference between the two sides of the head. Broca, Brown-Séquard, Gray, and myself have found the temperature of the left side of the head to be usually greater than that of the right. Gray (*New York Medical Journal*, August, 1878) gives the following as normal average temperatures: Left side of the head, 93.83° F.; right side, 92.92°. The maximum normal temperature of the head is between 94° and 95°. Very striking, then, is the observation made in this case of a temperature of 102° for the right and of 98° for the left Rolandic station. I do not recall any observations on head-temperature in cases of cerebral hemorrhage.

The respiratory phenomena exhibited by this case were of great interest. Respiration after the stroke exhibited three stages: 1st. For a short time it was what has been called the "tobacco-smoker's respiration." 2d. It soon changed to the Cheyne-Stokes type, and continued of this character for several hours. 3d. Two hours before death the Cheyne-Stokes respiration ceased, and the breathing became regular, but constantly feebler and shallower. The breathing in the first of these stages is that which is not infrequently seen in cases of deep unconsciousness from apoplectic strokes or cerebral traumatisms. Observers are perhaps too much in the habit of describing the respiration in apoplexies simply as "stertorous." The peculiarities of respiration should be carefully studied in each case. I agree entirely with Nothnagel (Ziemssen's Cyclopædia, vol. xii. p. 102) that the noisy, snoring, "stertorous" respiration is not universally present in hemorrhagic apoplexy, and is, moreover, met with in sopor due to other causes. The respiration in the second stage was perhaps not in every particular of the usual Cheyne-Stokes type, but it was certainly a form of this respiration, which has been described by Laycock as "recurrent brief apnœa,"—an expression very applicable to this case. The period of nearly regular breathing was comparatively long, being from four to five *minutes*, the apnœal stage lasting from eight to fifteen seconds. Sometimes in the Cheyne-Stokes respiration the breathing will be interrupted several times in the same minute. The respirations presented the ascending character, beginning after the apnœa with feeble movements and progressively increasing until a certain plane was reached. The descending scale described as usually present was, however, absent, the respirations stopping abruptly. It was not a true "ascending and descending respiration." Traube (*Berl. Klin. Wochenschr.*, 1869, No. 27) first directed attention to Cheyne-Stokes respiration in cerebral hemorrhage. According to Traube (quoted by Rosenthal, "Clinical Treatise on Diseases of the Nervous System,"

vol. i. p. 159), this type of breathing is produced by an insufficient supply of arterial blood to the medulla oblongata. This lessens the irritability of the respiratory centre, so that the normal quantity of carbonic acid present does not suffice to provoke an inspiration. The long intervals in the respiration are to allow large quantities of carbonic acid to collect in the pulmonary and general circulation. Schiff (Foster's Physiology, American edition, p. 479) has observed Cheyne-Stokes respiration as the result of compression of the medulla oblongata. In this case, great and somewhat varying pressure was exerted by the blood in the fourth ventricle.

What is taught by this case in regard to the nature of the apoplectic shock or stroke? The view that apoplectic shock, as well as traumatic shock, is, sometimes at least, caused by sudden displacement of the cerebro spinal fluid, seems to be well borne out by the lesions found after death. The sudden and copious hemorrhage probably caused an instantaneous rush of the intraventricular cerebro-spinal fluid through the aqueduct of Sylvius into the fourth ventricle, upon the vital centres of the floor of which it acted in such a way as to cause the sudden arrest of the functions of the brain. This is the doctrine of Duret. The laceration in the ventricular floor, the ecchymoses beneath the pia mater at various points, the minute extravasations into the brain-substance, and the hyperæmia of the membranes, were lesions exactly similar to those found in cases of cerebral concussion.

I have seen the post-mortem specimens from another case of ventricular hemorrhage, although I had not the opportunity of studying the patient's condition during life. The appearances were in many respects the counterparts of those presented by the present case,—the partitions between the ventricle broken down, the cornua distended, the Sylvian aqueduct dilated and torn, etc. The condition of the pia mater and surface of the brain was, however, more remarkable than that exhibited by the case reported this evening. Both the pia mater and the cerebral substance were in the highest degree hyperæmic, the case affording me the most striking illustration of congestion of the brain and its membranes which I have ever seen. The vessels in many places seemed just ready to burst. Hemorrhages of considerable size had occurred in several places. A large clot having no connection with the ventricular hemorrhage was found on the outer surface of the medulla oblongata; another, also of large dimensions, was discovered in the right Sylvian fissure, just over the outer edge of the island of Reil. Other extravasations of blood, of less size, were found in the left fissure of Sylvius, and at various points on the cerebral and cerebellar surface. These hemorrhages all evidently occurred after the burst into the ventricles, and were probably the result of the displacement of the cerebro-spinal fluid and the disturbances of the circulation caused by the apoplectic shock.

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THE PHYSIOLOGICAL ACTION OF ALCOHOL ON THE CIRCULATION.*

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INCREDIBLE as it may seem, no thorough study of the action of alcohol on the circulation has yet been made, the only papers on the subject being those of Parkes and Wallowicz ("Experiments on the Effects of Alcohol on the Human Body"), Zimmerberg (quoted in Dr. H. C. Wood's Therapeutics, p. 119, 1879), and Dogiel (*Pflüger's Archiv*, 1874, Bd. viii.), which are far from being complete. The last two observers performed their experiments on animals, but furnish us results which are not only directly opposed to each other, but are entirely contradictory of what we know of the physiological action of alcohol from its clinical use. These facts would lead us to suppose that some fallacy underlies some of their experiments, and this suspicion becomes a fact when the results of the present elaborate investigation and the knowledge we have gained from its clinical use are compared with them. The advantages of considering *seriatim* the action on different portions of the circulatory system are patent, and I will, therefore, first consider the action on the pulse, and then that on the arterial pressure.

The pulse.—The pulse-rate, as well as the character of the pulse-curves, is very decidedly affected by alcohol, this action differing very materially whether the drug is given in small or in large intravenous doses.

* Abstract from Prize Inaugural Essay, University of Pennsylvania, March, 1880.

Small doses cause an increase of the pulse-rate with increased cardiac force, the pulse is full, strong, and regular, and the curves are higher, and the arterial pressure is increased above normal. The increase of the pulse-rate ranges from one-fourth to one-half of the normal. Thus, in a rabbit to which 10 m. dilute alcohol were given, the pulse was increased from 96 to 156 in one minute after intravenous injection; a minute and a half later it marked 164, and then gradually subsided. In a large dog to which 1 cc. absolute alcohol was given per jugular vein, the pulse arose from 112 to 180 in three minutes, and was full, regular, and strong. If these small doses are often repeated, the pulse becomes extremely rapid, feeble, and irregular, and is accompanied with a marked diminution of the arterial pressure. By continuing the administration the pulse continues increased, the pressure gradually falls, and suddenly the heart is arrested in diastole. At other times by repeated injections of small doses the pressure is lowered, the pulse-rate slowed, and the cardiac power is observed to fail gradually; finally, a last injection arrests the heart in diastole. It is to be noted that small doses cause an increase of the pulse-rate, with a strong, full, and regular pulse, and increased arterial tension; small doses, frequently repeated, cause an increased pulse-rate, with a pulse rapid, feeble, and irregular, and diminished arterial tension, indicating that the increase in the former instance is a stimulant action, and in the latter one of depression.

Larger doses cause an immediate fall of the pulse-rate, with irregular pulsations; the pulse-rate then returns to or goes above the normal, but is accompanied by diminished blood-pressure. The increase above normal may be equal to one-half of the normal. If while this increase exists another dose is given, the rate may be still further increased, but the arterial pressure is considerably diminished; or it may immediately sink, the heart in a few minutes being arrested in diastole. The diminished arterial tension accompanying the very marked increased pulse-rate, and the rapid, feeble, and irregular pulse-curves, show an interdependence of change from the normal, and indicate that the increased pulsations and diminished pressure are dependent not upon stimulation, but upon depression. Still larger doses cause the pulse-rate to become immediately greatly decreased, the blood-pressure to fall rapidly, and the heart to be soon arrested in diastole. Small doses, therefore, cause an increased pulse-rate, with strong, full, and regular pulse-curves, and increased arterial pressure; while large doses may cause an increased pulse-rate, with feeble and irregular pulse-curves, and diminished arterial tension, or a decreased pulse-rate, with diminished pressure, from very large doses.

Parkes and Wallowicz found in their very carefully conducted experiments that the pulse-rate was increased with increased force. Dogiel states that the pulse is first increased, then diminished, then increased again, and Zimmerberg, that the pulse-rate is decidedly reduced; but it must be borne in mind that the latter used alcohol in very excessive doses, being equal in man to doses of a quart or two: thus, the reason why he got such a decided reduction of the pulse-rate was because of the enormous doses he employed. Dogiel does not publish his experiments, and it is impossible to see where his error lies. The results of my own numerous experiments being uniform, and corresponding with the knowledge derived from the clinical use of alcohol, and with the results Parkes and Wallowicz furnish, seem to insure their correctness, and it remains now to investigate in what way or through what media alcohol effects these changes.

Dogiel asserts that the primary increase is due to a stimulation of the accelerator nerves, the diminution to a stimulation of the par vagum, and the final increase to a paralysis of the par vagum. Zimmerberg states that the diminution of the rate is due to a stimulation of the vagi centres. In my own experiments on animals with cut vagi nerves, seven in number, it was found that the changes in the pulse-rate were the same precisely as in normal animals, thus showing that these changes are wholly independent of any action on the peripheral vagi nerves. Next, three experiments were made on animals with cut cervical cords, artificial respiration being maintained, and it was found that no change from the above results occurred, thus excluding the vagi centres. In other animals the accelerator nerves were cut, with the same results, showing that neither the par vagum nor the accelerator nerves were affected. This certainly indicates that all these changes in the pulse-rate occurring in normal animals must

be effected by an action on the heart alone. In order more fully to prove this, a number of animals, with both the vagi nerves and cervical spinal cords cut, were experimented upon, and the results were the same. It may, therefore, be considered proven that the increase of the pulse-rate, with full, strong, and regular pulse-curves, and increased arterial tension, is due to a direct stimulation of the heart; and that the increased pulse-rate, with rapid, feeble, and irregular pulse-curves, and diminished arterial tension, and also the diminished pulse-rate, are due to a depression of the heart.

Blood-pressure.—Alcohol in small doses has no effect, or else causes an increase of pressure, while large doses cause a decrease. Dogiel asserts that the pressure is primarily increased and secondarily diminished, and that during the latter condition the vaso-motor centres are paralyzed. Zimmerberg with his excessive doses always got a decided fall, which he attributed to the heart. In my own experiments I attribute both the increase and the decrease to a direct cardiac action, since it has been found that after the isolation of the heart from any centric nervous influence the same changes in pressure still occur, and as I found that when the fall of pressure was very pronounced the vaso-motor centres and peripheries were still intact,—the vaso-motor centres responding normally when the sciatic nerve was stimulated, and the vaso-motor peripheries in the web of a frog's foot, under a microscope, remaining unchanged after the hypodermic injection. If alcohol is directly applied to the web, a contraction occurs; but this is undoubtedly due to a direct irritant action.

It may, therefore, be concluded from the uniform results of my fifty-odd experiments—

1st. That alcohol in small doses causes an acceleration of the pulse, with increased cardiac force.

2d. That this acceleration of the pulse and the increase of the cardiac force are due to a direct stimulation of the heart.

3d. That alcohol in larger doses causes an acceleration of the pulse, with diminished cardiac force, and that this is due to a direct depression of the heart.

4th. That if the dose be excessive the pulse-rate is diminished from the first, or the heart may be immediately arrested, being due to a direct paralysis of the heart.

5th. That the heart is always arrested in diastole.

6th. That small doses cause a rise of the arterial pressure.

7th. That large doses cause a fall of the arterial pressure.

8th. That these changes effected in the arterial pressure are due to the action of alcohol on the heart alone, in the former case being one of stimulation, and in the latter one of depression.

9th. That alcohol in small doses is a cardiac stimulant, and in large doses a cardiac depressant.

PHYSIOLOGICAL LABORATORY, UNIV. OF PENNSYLVANIA.

PRELIMINARY NOTE ON POISONOUS DYE-STUFFS.

Read before the Philadelphia County Medical Society, September 22, 1880,

BY HENRY LEFFMANN, M.D.

GENTLEMEN,—I present this evening a brief notice of some observations upon the topic of poisonous dye-stuffs, my object being mainly to inform the members that I am engaged in studying the subject, and invite assistance in so far as to be allowed opportunity of making chemical examinations in cases which appear to arise from poisons of this class.

It will not be necessary to explain to what effects I refer. Irritation and inflammation of the skin are the most common forms in which the poisonous action of dyed fabrics is supposed to show itself. A case of skin disease limited to a part of the body which has been in contact with a highly-colored article—shirt or stockings, for instance—is at once ascribed to the dye-stuff, and, as a rule, to some metallic poison contained in it.

Without occupying time in the discussion as to what metals may cause the trouble, I shall here limit myself to the one which is most commonly charged as the cause,—arsenic. This substance is widely distributed, is found in many common chemicals, and may thus easily find its way into dyes. Of late years an additional liability to its presence has arisen from the fact that certain organic dyes are manufactured by the use of arsenic acid and a portion of the poison remains in the dye.

The preliminary investigation has been directed to discovering how far the arsenic

which is in these dyes may find its way into the fabric. Experiments made upon aniline red, as sold to dyers, showed that some samples did not contain arsenic. Yarns dyed with samples that did contain arsenic were examined by delicate tests, and did not show indications of arsenic. Samples of the liquid, both before and after the immersion of the yarn, were examined, the result indicating that very little if any of the arsenic was removed by the fabric. I submit herewith a sample of cotton yarn dyed with an arsenical aniline in the proportion of ten ounces of color to one hundred pounds of yarn. Portions of this yarn, being tested, showed no indication of arsenic.

An interesting case occurred some months ago in Syracuse, New York. A woman purchased at one of the carpet-stores in that city a number of yards of carpet, and proceeded to make it up. She was soon attacked by some skin trouble, which she ascribed to the carpet, and she complained to that effect to the dealers. They at once stopped the sale of the goods, wrote to the wholesale house in New York City from which they purchased the goods, and this house at once sent the complaint to the carpet-works in this city. A sample of the carpet was submitted to me. I made careful tests for arsenic, and found none. I submit the sample and give a list of the various dyes used in it. Those in italics are most likely to contain arsenic.

Cotton warp: white, starch size; green, Prussian blue, flavine, turmeric, *sulph. indigo*, alum; orange, flavine, hypernic, *tin solution*. Woollen woof: white, bleached and tinted with *sulph. indigo;* green, picric acid, *sulph. indigo*, alum, Glauber's salt, *oil of vitriol;* orange, flavine, cochineal, *tin solution;* ruby, *magenta*, turmeric, Glauber's salt, *oil of vitriol.*

I hold that the explanation of many cases ascribed to these dye-stuffs is either coincidence or idiosyncrasy; and I shall be obliged to the members of the Society for any opportunities which may be afforded me for making further investigations in the matter.

THE first Boylston prize question for 1882 is a premium of three hundred dollars for the best dissertation on sewer-gas and its physiological effects on animals and plants. It is an experimental inquiry.

A NEW MYDRIATIC—ADDITIONAL NOTE.

BY H. S. SCHELL, M.D.

THE appearance of an article under the above caption, in the *Times* for October 9, has naturally aroused the inquiry, "What is it?" In response, I would say that homatropin is a derivative of atropin, and is so named because of the similarity of its properties to those of the latter drug.

Homatropin was discovered by Professor A. Ladenburg, of Kiel, in the course of some experiments upon the synthesis of atropin. He has so far succeeded in this purpose as to be able to recombine the primary products of the decomposition of the natural alkaloid. By the action of baryta and hydrochloric acid atropia is split into *tropin* and *tropic acid*, as follows:

$$C_{17}H_{23}NO_3 + H_2O = C_8H_{15}NO + C_9H_{10}O_3.$$
Atropia + water = tropine + tropic acid.

In the course of investigations as to the possibility of making tropine and tropic acid artificially, he discovered that the former, under the action of strong hydrochloric acid and other conditions, is converted into a new base, which he calls *tropidine* $= C_8H_{13}N$. It is of an oily consistency, and has no effect on the pupil.

A number of new bases, called *tropeïnes*, have been obtained by warming tropine with organic acids and diluted hydrochloric acid. The only one of these which seems to possess special interest is homatropin, or *oxytoluyl tropeïne*. It is prepared from tropine, amygdalic and dilute hydrochloric acids. Merck states that it crystallizes in transparent, colorless, regular crystals. These are hygroscopic, and, at the same time, do not readily dissolve in water.

The *hydrobromate*, on the contrary, forms a salt which is not hygroscopic, but which is soluble in ten parts of water, and the solution keeps well. Merck, of Darmstadt, has undertaken the manufacture of homatropin hydrobromate on a large scale. It will, no doubt, be extensively used as its properties become widely known. I find it convenient to rely upon it exclusively in refraction cases in my consulting-rooms.

THYMOL.—Thymol-vaseline ointment is made by dissolving twenty grains of thymol in an ounce of vaseline. It is useful in eczema and as a parasiticide.

NOTES OF HOSPITAL PRACTICE.

PHILADELPHIA HOSPITAL.

CLINICAL SERVICE OF DR. HORATIO C. WOOD.

Reported by C. H. WILLITS, M.D.

CASE OF CLOT BELIEVED TO BE IN CRUS CEREBRI, FOLLOWED BY HEMIPLEGIA AND BY LOSS OF SENSIBILITY AND OF SPECIAL SENSES. ALSO, CEREBELLAR TUMOR WITH AFFECTION OF SPECIAL SENSE.

I WANT to call your attention to-day, gentlemen, to a case of brain-disease which is very interesting from a diagnostic point of view, but which, unfortunately, is not so interesting to the patient in reference to a cure.

This man, B——, aged 67, a sailor by occupation, presents the following brief history: eighteen years ago he fell from the mast-head of a ship, from the effects of which fall he remained unconscious for sixteen days, and when he awoke was paralytic, with the symptoms still persistent.

Now, you will notice that the patient is a powerfully-built man, with good muscular development, but, as he walks or stands, seems to have no control over the right side, and in walking uses his right leg in the manner of a walking-stick, the muscles being perfectly rigid and all motion being seated in the pelvis, the side of which is elevated at each step. You will notice also that the right arm and hand are paralyzed, the index-finger only retaining some slight motion; and if you will pay particular attention while I ask him a question, you will be impressed by his particular intonation when he speaks. There is no aphonia, because no loss of voice, and no loss of speech, therefore no aphasia; but he has, more correctly speaking, aphamia, or loss of the power of articulation, due to paralysis of the muscles of the face.

It is, therefore, a case of right-sided hemiplegia. There is nothing remarkable in that; but when I stick a pin into his arm he does not feel it, or if I make a pincushion of his leg, the pin can penetrate any depth without any apparent pain.

Again, if I put this burning match against his leg, he is not conscious of it until it has been in contact a long time; nor does he recognize the presence of ice.

Along with this loss of sensibility there is almost total blindness of the right eye, he not being able to see my fingers placed close to the eye, and the pin brought in contact with it shows entire loss of conscious sensibility, although the reflex movements are retained.

When my watch is placed close to the ear he cannot hear it, and when I place some salt in contact with his tongue there is no apparent sense of taste.

We have, then, the history of a blow on the head, from which resulted right-sided hemiplegia and loss of general sensibility which comes up close to the median line of the body without crossing to the opposite side, and complete loss of the special senses, these symptoms all having come on suddenly, not gradually.

Now, what is the matter with the man?

There is little doubt that this man has a clot, resulting from the blow, somewhere in the brain, and that this clot must be situated in the brain proper, and not in the pons or medulla oblongata.

For physiological purposes the brain is divided into two parts, the lower brain, or mesocephalon, and the higher brain, or cerebral centres. In this case the clot cannot be situated in the mesocephalon, because the influence is far too wide-spread.

Most of you know that there are two kinds of action, conscious and unconscious, or voluntary and involuntary, and that it is not necessary for action that we perceive an impulse, for it is a common thing for us to move unconsciously in either anger or sleep. When an impulse is transmitted along a sensory nerve it is received at the receptive centre of the medulla, and if, either from its own feebleness or owing to some obstruction to its farther progress onward, it does not reach the higher brain-centres, it may be reflected across to a motor fibre, and a motor impulse, which is purely involuntary or reflex in its character, result. But, on the contrary, to have a voluntary action, it is necessary that the track to the brain proper be open, and that there be sufficient impulse to rouse the brain to perceive the impression which is registered upon the medulla.

When I stick the pin in this man's eye, although sensation and sight are lost, yet he winks, which is a proof that there must be damage to this man's higher centres which precludes him from perceiving the sensation, while the centres of the trigeminal nerve are preserved. Further, if the clot was in the mesocephalon, it would affect some one and not all of the centres of special sense.

Now, where is this clot situated?

You know that above the pons are two white bands of nerve-fibres, the crura cerebri, which are the conductive means from the lower to the higher brain. Soon after their divergence each crus contains within it a small mass, called the locus niger, which separates it into the anterior and posterior portions. Farther on in its onward course it passes through two masses of ganglionic tissue, the optic thalamus and the corpus striatum.

Autopsies have shown that the formation of a clot involving the posterior portion of the crus below the optic thalamus is always followed by the symptoms of hemianæsthesia, such as are present in the case before us, as the fibres which pass from the mesocephalon to the cortical centres of conscious perception travel along this part of the crus.

It is a matter of scientific interest to know where these fibres go and where these cerebral centres are; but the almost complete impossibility of tracing these minute and numerous anatomical structures makes us accept the results of all such endeavors with reserve.

Meynert claimed to have traced them into the occipital lobes. Ferrier has found much reason for believing that the perceptive centres in the monkey are situated in the occipital lobe. In man, however, this is rendered doubtful by the fact that we may have complete loss of the entire lobe with loss of sensibility.

I saw, however, a case last March which seemed in a measure to sustain the views of Prof. Meynert. The following is an abstract from my case-book. A woman, aged 54, who had usually enjoyed good health, was taken with the general symptoms of Bright's disease, confirmed by examination of the urine, together with a peculiar paroxysmal headache confined to the anterior part of the head, marked difficulty of finding words, and failure of memory.

There was also some slight drawing of the face to one side and slight paresis of the left arm. From this time forward the symptoms grew steadily worse, the loss of memory becoming very prominent, and the aphasia increasing until nearly complete.

The palsy of the right side varied much from week to week, gradually increasing, but never becoming total.

Between two and three weeks before death the sense of smell and taste disappeared, and there was marked mental failure and apathy, but the patient knew everybody, and the sense of sight remained, seemingly, good.

The loss of the senses of smell and taste distinctly preceded by a considerable interval the coming on of stupor: how far the loss of taste was dependent upon the loss of smell was not distinctly made out, owing to the aphasia and lack of intelligence.

At the autopsy the kidneys and spleen were in an advanced state of atrophy, the brain, external surface and membranes, seemingly normal, except in the left island of Reil, where it was much softened, with microscopic evidence of an old clot in it. In the right hemisphere, in the posterior lobe a gliomatous tumor was found the size of a pigeon's egg, which caused great bulging into the ventricle, and the whole lobe, in the interior, was in an advanced stage of yellow softening, with frequent small hemorrhages.

I remember also a case which occurred many years ago in the wards of this house, in which, after death, the whole posterior cerebral lobe was destroyed by an abscess, and in which, during life, no loss of sensation or of the special senses was detected. I suspect, however, that in this case, and in very many of the reported cases of occipital disease, loss of sense was not perceived because it was not properly looked for. Coming back to the case now before us, the completion of the sensory palsy shows that the clot is not a cortical one, and we must conclude that it is situated in the crus and has been sufficient to destroy both the anterior and the posterior portion of the peduncle.

Let me say, before dismissing the case, that, as we properly understand the term, hemiplegia is a paralysis of the arm and leg of the same side, but not of the muscles of the trunk.

If you will notice this man, you will see that he breathes freely and can use voluntarily the muscles of respiration.

The following reason for this want of paralysis of the trunk-muscles in hemiplegic cases has been brought forward by Broadbent, of England. The legs are accustomed to act independently of each other, as are the arms, but not so with the muscles of respiration; they are used to action together. These centres, which are connected by commissural fibres, are so

accustomed to responding in union that the impulse is sent across and onward, although one centre is really gone.

This theory seems to be supported by these cases, and by the fact that independently-acting muscles become more readily paralyzed than those accustomed to act in unison.

As regards the treatment in this case, of course nothing can be done, the condition being not a disease, but a result.

TRANSLATIONS.

TREATMENT OF TINEA AT THE SAINT-MANDRIER HOSPITAL AT TOULON.—The Saint-Mandrier Hospital, one of the largest French hospitals, is situated at Toulon, and is under the charge of a well-known physician, Dr. Bérenger-Féraud, who has taken advantage of his opportunities to collect the statistics of tinea as treated in this institution, and publishes the results in the *Bulletin Général de Thérapeutique*, vol. ii., 1880, p. 49.

From 1860 to 1879—that is, in the space of twenty years—five hundred and ninety-three cases of tinea were treated in this hospital, the total number increasing year by year, and the proportion of cases as compared with the total number of cases of every description under treatment also increasing, the latter from .03 to 2.60 per cent. This increase is accounted for, according to Dr. Féraud, by the large number of sailors and others coming from Cochin China, and the increase in consumption of Algerian beef.

Dr. Féraud gives a table of some ten substances employed in the treatment of tinea, with the results obtained in the case of each. Among the substances used with little or no success were calomel, garlic, male fern, ethereal oil, pepo, and eucalyptus. Pomegranate in various forms was employed with varying success. The leaves, fruits, the herbaceous stems, and extract of the cortex were not successful, while the dry stems were more active, curing twenty-five out of thirty-nine cases. The various derivatives of pomegranate, punicene, sulphates of pelletiérine and isopelletiérine, and the tannates of methylpelletiérine and pseudopelletiérine were tried without much success in a number of cases. The most successful of all the remedies used, however, was the tannate of pelletiérine, which cured sixty-one cases out of eighty. Excluding a number of these substances which were simply used experimentally, the total proportion of cases successfully treated was 29 per cent., —a figure which seems small until it is mentioned that no case was considered successfully treated unless the head of the worm came away and was distinctly recognized.

Dr. Féraud has a poor opinion of the *pepo maxima*, which is, as is known, the most popular domestic remedy, and one largely used by the profession. After the most thorough and careful use of this remedy he succeeded in bringing away the head in only 7 or 8 per cent. of the cases.

TREATMENT OF CHRONIC ULCERS OF THE LEG.—Courty (*Cbl. f. Chir.*; from *Four. de Thérap.*, 1880, No. 11) has recently made an addition to the abundant but not fruitful literature of this subject, in which he begins by examining the question, What is the cause of the proverbial stubbornness of these ulcers? Apart from various disease-diatheses, from injuries to the tissues, and the influence of the vertical position, the chief trouble is local. The principal points in treatment are: 1, to excite the formation of healthy granulations; 2, to cause absorption of the swollen and hypertrophied tissues; 3, to prevent too rapid desiccation of the superficial epidermic layers during the process of cicatrization. To attain the first of these objects the author uses alternately rest, and active and passive movements. By rubbing and massage the circulation is aided. By wrapping the limb in cotton, plaster, rubber, etc., an antiseptic atmosphere is gained, and also methodical compression. By means of stimulants, as arsenic, copper, red oxide of mercury, the formation of granulations is favored. By nitrate of silver, aromatics, balsams, opium, etc., rapid cicatrization is effected.

Courty's procedure in leg-ulcers is as follows. First the sore is cleansed by washing with antiseptic solutions, as carbolic acid, salicylate of sodium, thymol, chloral, permanganate of potassium. Then, later, soap or an alkali is used to remove the débris and excess of epidermis. Proceeding then to the stimulation of the granulations, Courty spreads red precipitate ointment (strength of 1–50 to 30) on fenestrated pieces of linen, and then lays

these evenly over the ulcer. Over this cotton compresses are laid in sufficient thickness to absorb all purulent discharge. Over this is placed a slightly compressive rubber bandage. Courty says that patients soon learn to put this bandage on for themselves twice daily, which is advisable. He thinks that the red precipitate ointment, combined with the warmth and moisture, lead to active hyperæmia of the granulations, with absorption of the callous edges of the ulcer. When the granulations begin to grow excessive, and the border of the ulcer has softened down, it is time to begin the attempt at solid cicatrization. Courty thinks that care should be taken at this stage to avoid too rapid drying of the newly-formed epidermic layers, and the consequent puckering or fissuring about the border. Moist warmth he thinks best effects this.

Among the means used to favor cicatrization, Courty recommends an aromatic wine, containing occasionally some salt of copper or arsenic. Transplantation also, according to Courty, is advantageous when there is an extensive granulating surface. When the aromatic wine cannot be employed, nitrate of silver may be used, or, if this is too strong, Sydenham's laudanum. Frequently the application of the aromatic wine is followed by dressing with an ointment containing one part tinct. opii to ten parts simple cerate. This opium ointment is almost invariably employed together with compresses to finish up the cicatrization.

ANTISEPTIC PREPARATIONS. — M. J. Lucas Championnière gives the following formulæ (*Jour. des Sci. Méd. de Louvain*, 1880, p. 345):

Aqueous Solutions of Carbolic Acid.— For hospital use it is a good plan to color the stronger solutions red, so that attendants shall not mistake one for another.

	Stronger solution.	Weaker solution.
℞ Crystallized carbolic acid,	ʒxiij;	ʒviiss.
Alcohol,	ʒxiij;	ʒviiss.
Water,	Oij;	Oj.

Carbolized Oil and Glycerin.—

No. 1.—For oiling catheters, speculums, etc.:

℞ Crystallized carbolic acid, ℈iv;
Olive oil, ʒijss.

No. 2.—For dressings:

℞ Crystallized carbolic acid, ℈viij;
Olive oil, ʒijss.

Chloride of Zinc.—The most convenient solution for disinfecting purposes is one of eight parts to the hundred of water. This solution is strongly caustic, and leaves a white pellicle on any wounds which it may touch, with a thin cicatrix, which does not prevent primitive reunion. This solution is called for in wounds which have been or must necessarily be exposed. It is also to be recommended in certain cases of cold abscess where the cavity is organized. It is especially useful, however, in cases where carbolic acid poisoning is to be feared. The solution should then be of the strength of one to two to the hundred, or weaker.

Catgut.—Carbolized catgut is usually so poorly prepared by manufacturers that the surgeon should make his own. To have a ligature at once solid, distinctly antiseptic, and sufficiently resistant, the following formula should be exactly followed:

℞ Crystallized carbolic acid, ʒv;
Water, ʒss;
Olive oil, ʒijss.

The water is added to the carbolic acid so as to form a sort of emulsion, and this is dissolved in the oil with vigorous agitation. A few bits of stone should be placed in the bottom of the flask containing the solution, so as to prevent the catgut from lying on the bottom. The latter should be unbleached, and should be rolled into coils and placed in the flask, completely covered with the carbolized oil, and allowed to remain there for five or six months.

Silk Ligatures.—When catgut cannot be employed, silk ligatures, as recommended by Lister, may be used. These are prepared by plunging them into melted wax containing thirty grains of carbolic acid to four drachms of wax. The ligatures are then passed between a fold of linen to equalize the distribution of the wax and to remove the excess.

Boracic Acid and its Preparations.— Boracic acid is an excellent antiseptic, according to experimenters. In practice, however, it has not been found so available. Its slight solubility is a drawback to its use. However, it has the advantage of being non-poisonous, and may be used in certain localities when the other antiseptics cannot be employed. A saturated solution in the cold contains four parts to the hundred of water. As boiling water takes up one-third of its weight, advantage is taken of this to make boracic lint by dipping absorbent cotton in the solution.

The fine crystals which cover the texture of the cotton are not sharp, and are unirritating.

PLEURITIC EFFUSION — TREATMENT BY HYPODERMIC INJECTIONS OF PILOCARPIN. —Dr. Haminio Tassi (*Jour. des Sci. Méd.*; from the Italian) found, in a case of pleuritic effusion on the left side, that the greatest relief was given by injections of pilocarpin in the dose of one-third to one-half grain daily, which were well borne. The following symptoms were observed. The pulse increased in frequency a little after the injection, and continued thus for a short time. The temperature likewise increased within about six minutes, continuing so for some twenty minutes. At this time perspiration was established, after which the temperature gradually diminished to a degree somewhat lower than before the injection. Sialorrhœa showed itself a few minutes after the injection, and lasted several hours. There was no hiccough, nor any vomiting; but secretion of tears preceded perspiration, and sometimes lasted about an hour, and was confined to the right eye. Pupillary atresia was observed in only a single case; there was always dilatation; urine was scanty.

GENERALIZED ERUPTION AFTER THE USE OF CARBOLIC ACID DRESSINGS.—H. Zeissl (*Cbl. f. Chir.*, 1880, p. 542; from *Wien. Med. Wochenschr.*) reports a case of erythema urticatum following the employment of Lister's bandage in complicated fracture of the leg, and appearing on the eleventh day of its application. The dermatitis localized itself upon the back, sides, and extremities, displaying a diffuse patchy redness, strewn with isolated urticarious quaddels. The urine was dark green. The eruption faded away when salicylic acid was substituted for carbolic acid.

INFLAMMATORY DISEASE OF THE SKIN CAUSED BY A HITHERTO UNDESCRIBED ACARUS.—Geber describes an inflammatory skin disease occurring in laborers handling barley. A few minutes after coming in contact with the parasite a sensation of burning and itching is experienced, which is evidently due to the irritating influence of a yellowish-brown powder found on the hands. On microscopic examination, this powder is found to consist almost entirely of living and dead animals. On strewing the powder on the skin of healthy individuals, after a short time urticaria is produced. In more delicate skins, and after longer contact, papules, vesicles, and pustules, with the symptoms of eczema, are produced. Frequently loss of appetite, sleeplessness, and febrile symptoms occur, running over four to six days. In extreme cases more or less generalized dermatitis, with constitutional symptoms, occurs. The parasites are of an oblong-oval shape, yellowish-white color, and .022 centimetre long. They have a round head, with four pairs of feet. They belong to the Acarinæ. Since neither ova, embryos, nor sexually-different animals were observed, Geber thinks the parasite as found on barley occupies an intermediate stage of existence. He thinks the parasite similar to that found on corn and named by Ch. Robin *Chritoptes monunguiculosus*. He believes it to be a commoner cause of inflammation of the skin than is generally supposed.

PATERNAL INFLUENCE IN HEREDITARY SYPHILIS.—A. Wolff (*Cbl. f. Chir.*, 1880, No. 32), as the result of the study of seventeen personal and twenty-eight other cases, concludes as follows. In every case in which the mother is affected, the child is syphilitic or there occurs abortion. If the father is syphilitic and the mother remains healthy, the children are born healthy and remain so. Wolff denies the paternal infection entirely. He has never seen a child with hereditary syphilis whose mother has not shown more or less decided symptoms of the disease or has not at least given a history of infection.

Ricord's *choc en retour* and Von Bärensprung's infection in procreation lack foundation in facts, as also does the theory of late hereditary syphilis resulting from paternal infection, which is entirely unproved.

DOUBLE FRACTURE OF THE INFERIOR MAXILLA — TREATMENT BY THE ELASTIC BANDAGE.—Thibierge (*Cbl. f. Chir.*, 1880, p. 591; from *Gaz. Méd. de Paris*), after replacing the broken bones, fastened them in place by an elastic bandage. A cure was obtained, without necrosis or deformity, in a month.

ALKALIES IN THE TREATMENT OF STERILITY.—Professor Pajot, in a note to the *Bull. Gén. de Thérap.* (vol. i., 1880, p. 543), alludes to the statement made in a former number of that journal regarding the influence exercised by an acid condition of the vaginal secretions in preventing conception, and says he has used injections of Vichy water for many years in these cases.

PHILADELPHIA
MEDICAL TIMES.

PHILADELPHIA, OCTOBER 23, 1880.

LEADING ARTICLES.

THE PRODUCTION OF DIPHTHERIA IN THE LOWER ANIMALS.

DRS. H. C. WOOD and H. F. Formad have made a report to the National Board of a research made upon this subject. It is well known that pseudo-membranous affections occur in the lower animals offering symptoms similar to those of diphtheria in man, but it is not certain that these pseudo-membranous affections in the lower animals are the same as the human disorder.

Drs. Wood and Formad first attempted to create such affections by inoculating animals with membrane taken from persons sick with diphtheria. The poison was put in little pockets made with a lancet under the skin, or inoculated by scarification in the mucous membrane of the mouth: in many instances both methods were simultaneously practised. Thirty-two experiments were made, with six deaths. In no case was anything like diphtheria caused, except that in one experiment there was an indication of exudation upon the trachea, which, whilst it may have been due simply to a catarrhal inflammation, presents some of the characteristics of false membrane.

It has been asserted by Oertel that animals which have been inoculated with diphtheritic material die with their internal organs infested with micrococci, and that the presence of these is characteristic of diphtheria. Drs. Wood and Formad examined the internal organs of the rabbits which died, as well as the blood of those which survived, and found no micrococci, in this agreeing with Curtis and Satterthwaite.

In the post-mortem examinations in every case the internal organs were tubercular, and in many cases intensely so; tubercular disease was also found in the organs of rabbits which were killed some days after inoculation. It is therefore a very natural belief that in those cases in which death was long delayed it was due to tuberculosis. It certainly is very possible that when death takes place soon after inoculation it may be the result of a non-specific blood-poisoning, and not of diphtheria. In the experiments of Curtis and Satterthwaite death not rarely occurred in a very brief time; in those of Drs. Wood and Formad it was almost always very long delayed. The difference may have been from their using smaller portions of the diphtheritic material and inoculating less deeply than did the New York savants. In no case did inoculation in the mouth produce either local or general symptoms.

In order to discover whether the diphtheritic exudation acted specifically in the production of tubercle, or whether it merely set up a local inflammation which formed a focus of infection, small masses of innocuous foreign matters were placed under the skin. In five out of nine of these experiments tubercle was found after death. This large proportion apparently demonstrates that a simple local inflammation may, in the rabbit, act as a source of tubercular infection. When diphtheritic matter was inoculated, inflammation was almost always induced at the seat of the lesion, with the formation of large lumps containing cheesy matter; so that Drs. Wood and Formad reasonably conclude that the tubercles were secondary to these inflammatory foci, and were therefore an indirect, and not a direct, result of the inoculation.

The method by which Trendelenburg asserts that he succeeded in producing diphtheria in rabbits consists in placing the exudation matter in the trachea. In four experiments our investigators obtained once Trendelenburg's results; in numerous instances they proved that ammonia is able to produce in the cat and dog, as well as in the rabbit, a pseudo-membranous trachitis. Professor Oertel states that the membrane produced by cauterization of the trachea differs from diphtheritic membrane in containing no bacteria. In the recent research, when the death occurred very quickly, bacteria and micrococci were less abundant in the traumatic membrane than in that taken from the throat of patients, but when the animal survived some days, and the bacteria had sufficient time to develop themselves,—when, in other words, they were afforded as good oppor-

tunity of growth as in the natural disease,—they were immensely abundant, in some cases seeming to make up a large part of the bulk of the membrane.

If it be possible to produce a fatal pseudo-membranous trachitis by placing the diphtheritic membrane in the trachea, and possible to cause septicæmia by inoculating other portions of the body with the same material, it would appear as though diphtheria might be originally a local disease with a subsequent septic poisoning; and ten experiments were made to determine whether any products of disease other than diphtheritic exudations are capable of causing pseudo-membranous trachitis.

In two of these experiments pseudo-membranous trachitis was caused by the introduction of organic matter into the trachea. In both of the cases in which false membrane was produced the injected material was pus, and it will be noticed that only four such experiments were made; so that the proportion of successful results was very large,—much larger, indeed, than with true diphtheritic exudation.

Trendelenburg found that not only ammonia but also various other chemical irritants are capable of causing the formation of false membrane in the trachea; many years since it was proven that tincture of cantharides will do the same thing. It would seem, therefore, that in the trachea the formation of a pseudo-membrane is not the result of any peculiar or specific process, but simply of an intense inflammation,—an inflammation which may be produced by any irritant of sufficient power. This fact, certainly, is very suggestive in regard to the pathology of diphtheria.

It is certain that, as in the lower animals, so also in man, chemical irritants will produce a pseudo-membranous trachitis; we are also well assured that there is no anatomical difference which can be detected with the microscope between the lesions of true croup and of diphtheritic angina. A difference has been believed by some pathologists to exist between the two diseases, in that in croup the membrane separates easily, in diphtheria with great difficulty, from the mucous membrane. This seems to arise from a misunderstanding. The mucous membrane of the fauces and mouth has a squamous, not easily-detached epithelium, and consequently membrane connected with or springing from such surface is firmly adherent. The epithelium of the trachea is columnar, ciliated, and detaches with the utmost facility even in the normal condition of the organ; hence membrane attached to it separates readily. The membrane of diphtheritic trachitis is always readily detached in the line of the epithelium. The preparations of Drs. Wood and Formad show that the exudation of the croupous inflammation excited artificially in the trachea is not merely superficial, but also extends below the basement membrane. Some of the best clinical authorities of the day teach that there is no essential clinical difference between true croup and diphtheria, cases commencing apparently as local sthenic inflammation and ending as the typical adynamic systemic poisoning. Every practitioner must have seen cases of angina in which he was in doubt whether to call the affection diphtheria or not: the very frequent diagnosis of "diphtheritic sore-throat" is a strong evidence of this. There have been cases in which diphtheritic matters absorbed by a wound have produced symptoms very closely resembling those of ordinary septic blood-poisoning from post-mortem wounds, etc.; there have been cases of the formation of false membrane about wounds, etc., without any known exposure to a specific diphtheritic poisoning, indicating that the systemic tendency to this peculiar form of exudation is capable of being engendered by other than the specific poison of diphtheria; finally, diphtheria seems sometimes to be produced by exposure to cold.

A general view of these facts seems to indicate that the contagious material of diphtheria is really of the nature of a septic poison, which is also locally very irritant to the mucous membrane; so that when brought in contact with the mucous membrane of the mouth and nose it produces an intense inflammation without absorption—*i.e.*, by a local action. Whilst absorption is not necessary for the production of the angina, it is very possible that the poison may act locally after absorption by being carried in the blood to the mucous membrane. Further, under this theory it is possible that the poison of diphtheria may cause an angina which shall remain a purely local disorder, no absorption occurring; or a simply local trachitis produced by exposure to cold, or some other non-specific cause, may produce the septic mate-

rial whose absorption shall cause blood-poisoning, the case ending as one of adynamic diphtheria.

PROCEEDINGS OF SOCIETIES.

PHILADELPHIA COUNTY MEDICAL SOCIETY.

A CONVERSATIONAL meeting was held at the Hall of the College of Physicians, Philadelphia, September 22, 1880, Dr. Albert H. Smith, President of the Society, in the chair, when Dr. H. Leffmann read a paper entitled "A Preliminary Note upon Poisonous Dye-Stuffs" (see page 46), which received a vote of thanks.

CRUSH OF NASAL BONES, WITH EXPEDIENT FOR OBVIATING DEFORMITY.

Dr. Charles B. Nancrede reported a case of compound comminuted fracture of the nasal bones and nasal process of the superior maxillary bones caused by the kick of a mule, in which he had resorted to the expedient first suggested by Erskine Mason, of New York, for the purpose of supporting the bridge of the nose until union took place. The accident occurred about seven weeks ago to a patient admitted into the Episcopal Hospital of this city. Finding the parts crushed and shapeless, he had passed an acupressure-pin across through the root of the nose, and held the bones in position with adhesive plaster, with cold-water applications. No grave complications presented themselves, and in the course of a week he removed the pin, and was much gratified to find a good result, which he was certain could not have been obtained by any other means, for the articulating process of the frontal was fractured, and probably the perpendicular plate of the ethmoid as well.

CEREBRAL APOPLEXY.

Dr. Charles K. Mills reported a case of cerebral hemorrhage into the basal ganglia (see page 41).

Dr. C. B. Nancrede inquired if the lecturer laid any stress, in the diagnosis, upon the flexion of the middle finger of the patient's hand.

Dr. Mills said that he had observed this point particularly because it might be of service in localizing a lesion of the cerebral cortex. According to the observations of Fritsch and Hitzig, and those of Ferrier, the centre for the right upper extremity is located behind the fissure of Rolando, in the fourth and fifth descending parietal convolutions. Irritation of this point, in the investigations of Ferrier, caused flexion of the fingers. In the case reported, the blood was exuded just below this region. He did not say that this was the explanation, for pressure upon the basal ganglia might have caused it. If this symptom, however, had remained isolated, he would have believed that it pointed to a cortical lesion.

Dr. Nancrede said that the local contraction must have been caused by the action of the interossei muscles, which extend the first phalanx and flex the second and third. He also asked if such a large effusion was not unusual, and whether or not the convolutions showed unusual pressure.

Dr. Mills said that the ventricles were enormously dilated, and the entire brain pressed upward; the convolutions were flattened; the vessels were much congested, and during the examination seventeen ounces of blood escaped. He had seen only one other case in which the hemorrhage had proved as extensive. The vessels also showed evidence of miliary aneurism, and one specimen taken from the base showed a rupture of its coats; there were also small spots of dilatation and points of degeneration. In regard to the muscular contractions in the fingers, as they existed on both sides, they were probably of central origin.

Dr. Packard asked whether hemorrhages upon the surface of the brain would cause a local rise in the temperature.

Dr. Mills replied that he had not taken any surface-temperature observations in this case; but in other cases he had undoubtedly found a rise under similar circumstances, and believed that this might be of service in localizing the clot.

CASE OF FOREIGN BODY IN THE URETHRA AND BLADDER REQUIRING PERINEAL SECTION.

Dr. Charles B. Nancrede reported a case of unusual interest, occurring in the wards of the Episcopal Hospital, of a patient who was admitted with a supposed medical ailment. On the second day after admission the speaker's attention was called to the case. He found him passing very little urine. Upon examination, an ordinary pen-holder was found lying in the urethra, partly in the bladder and partly in the spongy urethra, the end being discernible to the touch in the perineum. The size was about No. 25 French scale. It was found to be impracticable to withdraw the foreign body by the ordinary forceps through the meatus, and perineal section was resorted to. With the exception of some cystitis, the man did well after the operation; no fistula resulted. The section was made in the median line, through the bulbous portion of the urethra. No severe hemorrhage occurred.

Dr. Schapringer suggested the introduction of a large catheter to envelop the foreign body.

Dr. Packard said that a mechanical difficulty existed to prevent the plan just pro-

posed. The difficulty was in the long, straight extremity of the pen-holder; the force of the friction of the catheter would not be sufficient to maintain its hold, even if it could be coaxed over it as suggested. He inquired whether it would not have been a simpler plan to perform the ordinary lateral lithotomy operation, and cut the stick in half and withdraw it in section.

Dr. Nancrede said that the operation performed had occurred to him as being the most appropriate. The hemorrhage was readily controlled by hot-water applications.

THE USE OF CHLORATE OF POTASSIUM IN FURUNCULAR AND CARBUNCULAR AFFECTIONS.

Dr. J. V. Shoemaker reported remarkable success from the use of chlorate of potassium, given in large doses, in scrofulous skin diseases and in furuncular and carbuncular affections. He had lately been invited to see a case in the practice of Dr. Boardman Reed at Atlantic City. It appeared that the use of large doses of this salt had decidedly reduced the amount of suppuration in the case named; and in other cases he had had equally satisfactory results.

Dr. Reed, being present, was invited by the President to give the details of the case.

Dr. Boardman Reed said that the patient was a young girl who had two carbuncles, one upon the back of the neck and the other in front of the ear; they afterwards extended downward until the affected area was about five inches in extent. The patient was very weak; she became feverish, and the pulse was rapid and feeble. Very little hopes of her recovery were entertained until the chlorate of potassium was used in decided doses (gr. iii every three hours), in conjunction with iron and supporting diet, when she rallied and subsequently became quite well.

Dr. Frank Woodbury said that he would regret very much if the impression were gathered from the case just mentioned, or from remarks that had been made before the Society, that potassium chlorate is an entirely harmless remedy, as it has caused death in a number of reported cases. The symptoms of poisoning are by gastro-intestinal irritation, and as small an amount as half an ounce has proved fatal. Like all the other potash salts, the chlorate possesses high diffusive power, and readily enters the blood, to which it gives a bright-red hue. This is not due, however, to its yielding any of its oxygen to the red-blood cells, because it is a very stable salt and requires a red heat before it is decomposed. It is eliminated in its own form, appearing in nearly all the secretions. Being only slightly soluble in water, it is deposited very frequently in the pelves of the kidneys; and in cases such as diphtheria, where the renal organs are already affected, or in chronic Bright's disease, such obstruction might prove of serious import in an already damaged kidney. The speaker, after listening to Dr. Drysdale's paper upon "Chlorate of Potassium in Croup," read before the Society about two years ago, had used it as recommended in comparatively large doses, and had seen several infants profoundly impressed by it, and even threatened with collapse, having a pallid face, a cool skin, feeble respiration, fluttering pulse, and complete muscular prostration, from which they recovered only after the withdrawal of the remedy and the application of heat and stimulants. Several articles had appeared in the medical journals lately, calling particular attention to this danger from chlorate of potassium. He wished to emphasize the fact that there is no evidence whatever that when given internally it yields any oxygen to the blood, as has been asserted; nor is it a stimulant to the circulation; on the contrary, it is capable of causing profound general depression, and is a paralyzer of the heart. In large doses it is a gastro-intestinal irritant, while after absorption the danger of blocking the kidneys mechanically with crystals of the salt, precipitated from concentrated urine, should not be forgotten.

Dr. Shoemaker said that Dr. Alexander Harkin, of Edinburgh, had reported a few years ago a number of cases of scrofula and tuberculosis in which this remedy had produced excellent results. He had himself been using it for four or five years, and had never seen any fatal result. He gives it in one-half to two-grain doses in children, and about ten grains in adults, especially in weak and anæmic cases. Children will fatten under its use, and the anæmia will gradually disappear. In the majority of instances he had given it simply dissolved in water, without combining it with any other remedy. He had made post-mortem examinations of cases who had taken this remedy, but had never seen it deposited in the tissues.

Dr. Henry K. Leffmann said that the possibility of a mechanical action should be borne in mind, as the crystals are sharp and not very soluble,—something like the sulphate of potassium used in Dover's powder. He had been surprised that the chlorate of sodium had not been substituted for the potassium salt, on account of its greater solubility.

Dr. J. Solis Cohen said that he had given chlorate of potassium a great deal for the last twenty years. In diphtheria there is a tendency to kidney disease, and the possibility of giving rise to trouble should be remembered. The gentleman referred to by Dr. Shoemaker as recommending this remedy for scrofula seems to use it in the majority of diseases; it appears to be a hobby with him. He gives it simply in solution (one ounce of the chlorate to one pint of water), and also uses it to apply externally to burns, etc. His idea is that it breaks up in the system and yields oxygen. It is worthy of note that the sub-

stances found useful in diphtheria are generally chlorine compounds.

Dr. Leffmann said that, without discussing its therapeutic effects, he wished to observe that we cannot introduce an oxidizing agent into the blood without at the same time producing a corrosive effect. This does not occur from potassium chlorate.

Dr. Shoemaker said that the original paper by Dr. Harkin which he had referred to was very favorably received by the Society before which it was read, and elicited a very interesting discussion.

Dr. Parish said that there is one objection to the use of this remedy in young children, and that is its local irritant action upon the stomach. He had formerly used the chlorate in saturated solution and also in powders, and had frequently noticed that the children were restless after taking it, and in several cases there was vomiting. For its local effects upon the fauces he still continues to use it, but apart from this he had not been able to notice any particularly good effects from this remedy.

Dr. Laurence Turnbull said that he had had considerable experience with this salt, especially since Dr. Drysdale's paper was read. He recalled a case of diphtheria that he had been called to see, where a solution of chlorate of potassium was given in solution (a teaspoonful to a tumblerful of water) almost *ad libitum*. In the afternoon the child became worse; the skin became blue, the kidneys were irritable, there was a strong desire to pass water frequently, and strangury. The child passed into a coma and died. He was satisfied that the large doses of chlorate of potassium had an unfavorable influence upon the patient, and he resolved to give it more cautiously and only in small doses. It is a valuable remedy in aphthous sore mouth and sore throat, especially syphilitic sore throat, and care should be taken to have a perfect solution.

Dr. Atkinson said that he had always recommended chlorate of potassium and tincture of chloride of iron in diphtheria in decided doses, though not in a saturated solution. He had followed this in his practice, and had never seen any bad results.

Dr. Shoemaker said that during an attack of diphtheria, from which he suffered last winter, there had been great irritability of the stomach, and the only thing that he could retain or that gave him any relief was chlorate of potassium. He used it very frequently at his Dispensary for Skin Diseases with good results, beginning with small doses and gradually increasing them. He had taken himself from three to five grains quite frequently.

Dr. Wittig recommended the combination with iron and tonics. He had read that the chlorate might be used as an antiphlogistic agent standing between nitrate of potassium and chloride of ammonium.

JAMAICA DOGWOOD IN NEURALGIA.

Dr. Cohen inquired whether any member had any experience in the use of Jamaica dogwood in neuralgia, which had lately been recommended as a substitute for opium. It is said to have a powerful effect upon fishes. It is a powerful anodyne, relaxing the system, producing salivation and sweating, and does not cause constipation. He had employed it in one case, when the result was doubtful.

Dr. Boardman Reed, by invitation, said that he had used the remedy in two cases of neuralgia of the face which had been suffering for years and had taken opium, morphia, and all the usual remedies. They both had great relief from teaspoonful doses repeated every three hours: one required two doses, the other five or six. In the latter case nausea was experienced after several doses had been taken.

MEDICATED COTTON.

Dr. Laurence Turnbull said that he had formerly found much difficulty in applying iodoform in ear diseases either in substance or in solution in alcohol and glycerin, but this had been recently obviated by a preparation recommended by Dr. Woakes, of London, absorbent cotton being impregnated with a solution of iodoform and dried. This agent is very valuable in affections of the nose and ears attended by chronic discharges. It may also be obtained containing astringents, Monsel's salt, boracic acid, and in other useful combinations, at our leading drug-stores.

F. W.

PATHOLOGICAL SOCIETY OF PHILADELPHIA.

THURSDAY EVENING, SEPTEMBER 23, 1880.

The PRESIDENT, DR. S. W. GROSS, in the Chair.

The etiology of fractures of the cranial base, and the anatomico-pathological reasons for their fatality.

DR. C. B. NANCREDE read a paper with the above title (see page 33).

Dr. H. LENOX HODGE said that the paper presented by Dr. Nancrede was able, original, and instructive. Many of the conclusions would meet the hearty approval of all. He regretted that Dr. Nancrede had not completed his paper by performing and reporting a series of experiments upon the cadaver. The number of post-mortem examinations that can be obtained after fractures of the base of the skull is necessarily limited. The various forms of injury that produce fractures at the base of the skull can be readily repeated on the cadaver. The effects of blows, of falls, and of gun-shot injuries can thus be easily studied.

Clinical observations and experiments have brought out many points of interest. Injuries

to the forehead are followed by fractures of the anterior fossæ, injuries of the temporal regions by fractures of the middle fossæ, and injuries to the occiput by fractures of the occipital fossæ. A fracture at the base of the skull is almost always accompanied by a fissure in the corresponding portion of the vault. The result of a blow or a fall on the head is due not only to the effects produced at the point of impaction, but also to those at the point of resistance. The cause of death after these injuries is due frequently to the direct effect of the vibrations upon the brain itself at the time of the injury, rather than to any secondary effects produced on it by the fracture of the skull.

Dr. SEILER said that he understood Dr. Nancrede to say that the injuries at the base of the skull were due to vibrations excited by the blow or fall upon the cranium, which were transmitted along the best conductor of vibrations, the thicker portions, to the base of the skull, where, by the meeting of different sets of vibrations coming over different routes, they were so augmented as to break the bone. He would like to call attention to the fact that this was an error of pathology, as the thicker portions of the bone were not better conductors of the vibrations than the rest of the base, but that they were capable of transmitting vibrations of greater amplitude. The conductivity of a substance for vibrations depended upon the proper relation of elasticity to density, and he cited as an example rubber, in which the elasticity is much greater than the density, and it is therefore a bad conductor of vibrations.

Dr. Seiler said that in regard to the second point there might be cases in which the vibrations might be anticipated by meeting instead of their amplitude being augmented, and this took place, as he showed by a diagram on the blackboard, where the depression of one wave fell together with the elevation of another one coming from a different direction.

Dr. CHARLES K. MILLS thought that in considering cranial fractures and concussion, and their consequences, the author of the paper should not have overlooked the investigations of Duret on Cerebral Traumatism. This distinguished cerebral physiologist has published the results of an elaborate experimental research and clinical study, under the title of "Experimental and Clinical Studies upon Cerebral Traumatism" (Paris, *Le Progrès Medical*, and A. Delahaye, 1878). The *American Journal of the Medical Sciences* for January, 1879, contains an able review of Duret's work. The cranium is a closed cavity with elastic walls. The elasticity of the skull can be readily proved. Duret mentions an experiment of Félizet, who filled a skull with melted paraffine, cooled it, and let it fall from a height of two and a half feet. The paraffine at the point corresponding to the blow showed a flat surface which indicated a depression of the skull of one-third of an inch. Not only is the skull elastic, but its contents are practically incompressible. A sudden blow on the cranium will therefore be transmitted to all parts within. A strong cask filled with a liquid may be burst by striking on the bung, or by pouring a few ounces of liquid into a long, vertical tube communicating with the interior of the liquid. Experiments of this kind are familiar both to practical men and to school-boys. Liquids transmit pressure equally in all directions, but, the contents of the cranium not being homogeneous, the effects of a blow upon the outside of the skull will be exerted from within outward upon certain regions of the brain and skull more strongly than upon others. The consequences both upon the brain and upon the skull are likely to be more disastrous when a blow or a fall is upon the top than when it is received upon the side of the head. Duret's explanation of this fact is that when the impact is in the transverse axis of the cranium a *cône de soulèvement*, or elevation of the skull, takes place at a point immediately opposite to the *cône de dépression* produced at the point of impact, and in this way the effect of the blow is diminished. When the blow or fall is received on the vertex, this saving cone of elevation cannot be formed, because the region opposite rests upon the spine and will not yield, and because also, perhaps, the structure and shape of the cranial base are such as largely to prevent such a result.

In cases of fracture at the base or at any other part of the skull, fatal effects or serious results, such as fever, paralysis, or convulsions, are not always, and perhaps not usually, due to inflammation set up about the seat of fracture. The researches of Duret here again afford us a satisfactory explanation of phenomena which would otherwise be inexplicable. A blow or a fall sufficient to produce a fracture of the floor of the skull would be more than sufficient to cause the lesions and symptoms, either primary or secondary, which Duret studied under the head of cerebro-spinal shock. By blows upon the head and by injecting liquids within the skull lesions were produced in almost every portion of the brain. Some of these were the following: direct laceration and hemorrhages of the meninges; hemorrhages at various points at the base of the brain; extravasations of blood within the fourth ventricle; tearing of the foramen of Magendie; splitting of the floor of the ventricle; interstitial hemorrhages in the substance of the pons and medulla oblongata; hemorrhagic lesions even in the spinal cord. The symptoms produced by cerebro-spinal shock are, in very broad terms, changes in respiration, circulation, and intelligence, and spasm, tremor, paresis, or paralysis of certain muscles.

In regard to the spasmodic symptoms, in particular, which follow injuries to the base

of the cranium or to other portions of the skull, Dr. Mills believed that at least three explanations might be given of their production: (1) direct irritation of the dura mater by spiculæ of bone, by clots, by spreading inflammation, etc.; (2) direct irritation by similar means of the cortical motor centres; (3) irritation from the effects of cerebro-spinal shock of the centres of the bulbo-pontine region Numerous experiments by Duret have shown that the dura mater contains sensory nerves, readily excited, irritation of which gives rise to reflex spasms or contractures. The irritation is conveyed by these sensory nerves to the motor centres of the pons and medulla oblongata. Local irritation of the cortical motor centres may be caused by meningeal hemorrhages, by friction, and in other ways. By irritation from the effects of the cerebro-spinal shock he meant the rents, extravasations, and secondary inflammations of the convulsive zone of the floor of the fourth ventricle.

Dr. Mills also called attention to the analogy between the consequences of apoplectic shock and those of shock from blows and falls upon the head. In cases of hemorrhagic apoplexy the brain is struck a blow from within, instead of from the outside as in traumatisms. In sudden and extensive hemorrhages, displacement of the cerebro-spinal fluid sometimes takes place. He had recently reported to the Philadelphia County Medical Society a case of hemorrhage in the basal ganglia, followed by effusion of blood into the ventricles, in which the upper part of the floor of the fourth ventricle was found to be split to a slight depth in the median line. He thought it probable that at the time of the apoplectic stroke the cerebro-spinal fluid had been suddenly forced through the aqueduct of Sylvius, and that the walls of the fourth ventricle had been subjected to an outward pressure sufficient to cause a partial rupture. In such cases of apoplexy, besides the direct destruction caused by the effused and spreading blood, lesions similar to those seen after great external violence are usually present. These are small hemorrhages into and beneath the meninges, hemorrhagic spots in the pons, medulla oblongata and cord, etc. Many of the symptoms, immediate and remote, of apoplexy are the same as those of cerebral concussion or sudden cerebral compression.

In closing the debate, Dr. NANCREDE, replying to Dr. Hodge, said that he could only again apologize for the many shortcomings of his paper, no one being more aware of them than himself. Unfortunately, however, owing to the absolute impossibility of giving more time to its preparation, the experiments that Dr. Hodge referred to had to be omitted. Dr. Hodge would bear him out in the statement that he had applied to him for some heads to experiment upon, but that time was wanting. He differed from him, however, as to the ease with which fractures could be produced. It is, indeed, a simple matter to cause an extensive fracture of the skull, implicating the base, but very difficult to produce one involving the base alone, as shown by the specimens and the case related, and which Dr. Nancrede contended gives the key to the causation of the more extensive injuries.

With regard to Dr. Seiler's strictures as to the correctness of the term "conductors of vibrations," he acknowledged their propriety, and would, by his leave, correct it when publishing the paper. Dr. Seiler should recall the fact, however, that Dr. Nancrede in one part of his paper had termed the thickened ridges of bones "reinforcers" of the vibrations. As to the fact that the vibrations might meet and neutralize one another, he had thought that to be so self-evident as to require no statement regarding it. He would append a foot-note which would prevent others from being led astray by this omission.

Finally, as to Dr. Mills's criticisms, he must again say that his paper necessarily was limited to the consideration of certain points only. Perhaps a better title would have been "Some Hints as to the Etiology of Basal Fractures," rather than "The Etiology." He could not, however, agree with Dr. Mills as to the explanation of the slight cases which he had distinctly stated formed the text for his paper. He acknowledged the truth of most of Dr. Mills's remarks, but still thought that the cases described were better explained by his own paper. Dr. Mills made no sufficient allowance for the displacement of cerebro-spinal fluid. Again, experiments do not explain the fact that the bony lesions do *not occur* exactly opposite the point struck, as the "cones theory" would imply, but at certain definite portions of the cranial base, to a marked extent irrespective (with certain limitations) of the point struck. Dr. Nancrede had, it would be remembered, not denied injury to the brain opposite to the point of impact. The cause of death, in the cases cited, did not seem to him due to the cerebro-spinal shock and its consequences, there being no evidences of active disease gradually supervening from the traumatisms *until normal vibrations had been excited in the cranial walls which failed to be conducted to their normal points for arrest, and in consequence irritated the brain and its envelopes.*

Again, Dr. Mills failed to appreciate the fact that when a fracture results the vibrations are chiefly, if not entirely, confined to the bone itself, it being a well-known fact that the more extensive splinterings of the vault, for instance, are often accompanied with but few evidences of injury and irritation of the subjacent brain: so that the constant contusion of certain portions of the base of the brain which are not necessarily opposite to the point struck, but correspond to the fracture, supports the views taught in the paper.

GLEANINGS FROM EXCHANGES.

RECENT INVESTIGATIONS ON THE ANTAGONISM OF QUININE AND ATROPIN.—According to the *Lancet* (vol. ii., 1880, p. 176), an interesting contribution to the facts relating to the antagonism between the actions of drugs has been supplied by Panteljeff with regard to two drugs in common use,—quinine and atropin. The salts employed were the chloride of quinine and the sulphate of atropin, and the experiments were made upon dogs, rabbits, and frogs. An injection of quinine beneath the skin of the frog in summer arrests the heart in diastole, but a subsequent subcutaneous injection of atropin causes it to resume at once its pulsations. The appearance of the heart when its action is arrested by the influence of quinine is as if the blood-pressure upon the heart was greater than the cardiac walls could contract upon. If atropin was injected first, so as to cause an acceleration, this was arrested by the quinine. With winter frogs the influence of the quinine was more frequently to cause a gradual retardation in the action of the heart, which was only arrested after a time, with loss of reflex action and death. The injection of atropin did not prevent this, but retarded the heart still more. Microscopic examination of the vessels of the web of the foot showed that the quinine caused a narrowing of the small arteries to one-half their previous calibre, while atropin dilated the vessels. In rabbits it was found that when the heart's action was arrested by quinine, atropin caused it again to beat, and the auricles began to contract before the ventricles. In both dogs and rabbits the blood-pressure in the carotid rose after the injection of quinine, when the pulse was rendered less frequent. It was found that immediately after the injection the blood-pressure suddenly falls, but after a few seconds it rises to a higher degree than before the injection. In small doses the pulse is often accelerated during the increased pressure, but with large doses the pulse is retarded from the beginning. If repeated injections are made, every injection causes, first a sudden fall of pressure, with retardation of the pulse; then the pressure rises, to fall again after a new injection. This initial fall in the blood-pressure is probably due to a sudden contraction of the vessels of the lungs, hindering the passage of the blood into the left ventricle and the aorta. The cardiac contractions become, at the same time, less frequent, but stronger. The arteries of the aortic system then contract and cause an increase in the blood-pressure, and, at the same time, an acceleration of the pulse. Larger doses have a direct influence upon the heart, so that, later, the cardiac action becomes retarded and the blood-pressure falls. The pneumogastrics remain excitable by electricity, but their division exercises no marked influence upon the pulse, especially when the respiration is retarded by the action of quinine. Subsequent injection of atropin accelerates the pulse, even when the pneumogastrics have been divided. In only one observation upon dogs was an arrest of the heart by quinine prevented by atropin. The increase of pressure caused by quinine was disturbed and retarded by the preceding injection of atropin. Direct application to the heart of frogs showed that not only can quinine arrest the action of the heart, but that it can also, under certain circumstances, act as a stimulant to excite it to action, and the effect depends upon the condition in which it is.

A PLEA AGAINST THE RESECTION OF THE RIBS IN EMPYEMA.—Under this title Dr. Charles A. Leale (*New York Medical Record*, vol. ii., 1880, p. 317) gives several cases in point, and adds the conclusions to which his experience has led him. They are as follows:

He would, as in tracheotomy and abdominal paracentesis, prefer to use the scalpel to open the chest. 1. As a safer procedure, knowing exactly what is being cut. 2. An incised wound is known to heal, if required, with greater certainty. 3. That by using a long, male, silver catheter the most dependent part of the chest can be emptied of its fluid contents, and there is no danger of pricking the lung from change of position or movement of the patient while the liquid is being withdrawn, as noted by Dr. Allbutt. 4. That when pus has commenced to undergo that change preparatory to absorption, the probabilities are that very little, if any, will be produced after the operation if the wound is immediately closed. 5. That in closing the wound under the above circumstances, the little atmospheric air admitted and the small quantity of pus left are very soon absorbed. 6. That if pus again accumulates in the chest, the operation is so easy, the pain so slight, and the closure so rapidly accomplished that a repetition is nothing to be feared, and really causes less prostration than when a large incision is made, and possibly pus found with greater rapidity. 7. That atmospheric air, pus, and blood, even to the extent of about eight ounces, may be absorbed, and that the injured, compressed lung can again resume its normal condition, as is conclusively proved by recorded post-mortem examinations. 8. That when unhealthy decomposition has commenced, the wounds ought to be left open and the part carefully disinfected. 9. That thoracentesis should oftener be performed for the quick removal of fluid from the chest, even, as recorded, during far-advanced phthisis pulmonalis, when relief may be obtained, life prolonged, and painful death averted. The resection of the ribs during the operation of thoracentesis has now been resorted to quite frequently during the past six years in America, Great Britain, France, and Germany,

without adding to the safety of the patient, and in a large number of instances, Dr. Leale firmly believes, has been the means of long procrastinating an apparent recovery, while in others death, it appears, has been the direct result.

FOOD-ADULTERATION.—At the recent meeting of the American Social Science Association (*New York Medical Record*, vol. ii., 1880, p. 331) Professor S. W. Johnson, of Yale College, read a paper on the "Adulterations of Foods, Drugs, and Domestic Articles," the paper being an exhaustive review of the subject. From the long list of adulterations mentioned may be taken the following:

Wheaten flour, with rice, barley, peas, beans, buckwheat, millet, and boiled potatoes; bread, with alum, sulphate of copper; yeast, with alum; baking-powders, with terra alba, such as plaster of Paris, whiting, and kaolin; milk, with sugar, salt, soda and chalk, annotto and turmeric, gum-dextrin, emulsion of hemp-seed, boiled starch, and pulverized brains; cheese, with potatoes, beans, vermilion-red and red chalk, sulphate of copper, arsenic, and corrosive sublimate; lard, with boiled starch, alum, and quicklime; confectionary, with red lead, chromate of lead, and vermilion, Prussian blue, copper, and arsenic; pickles, with sulphuric acid and verdigris; mustard, with wheat flour and turmeric, charlock-seed, cayenne, and ginger; coffee (ground), with wasted acorns, spent tan-bark, spent logwood, mahogany, sawdust, and burnt horse's liver.

In answer, however, to the question, "Are we in the United States liable to suffer in purse and in health from the adulterations that are now practised upon our food?" the answer is a qualified negative. We are not suffering serious loss of goods or of health.

ERGOT-POISONING.—Dr. John M. Keating (*New York Medical Record*, vol. ii., 1880, p. 318) gives the case of a woman recently delivered, to whom, by a misunderstanding, half a drachm of fluid extract of ergot was administered every half-hour until eight doses had been taken, two drachms having been previously given. The entire amount ingested was six drachms within four hours. When seen, the patient's face was of a bluish tint, and she seemed in great pain; the pupils were dilated, the pulse quick, weak, and occasionally irregular; there was no dyspnœa, nausea (no vomiting), buzzing in the ears, and at times a tendency to syncope. The skin was cool and clammy; there were powerful uterine contractions. Dr. Keating loosened the binder, gave her some whisky, and stimulated the circulation by rubbing, and in the space of half an hour the severity of the symptoms had gradually passed away, and the patient was left to sleep off a dose of morphia and bromide of potassium.

SOOTHING OINTMENTS.—In an article on this subject in the *Specialist* (September 1, 1880) Dr. McCall Anderson says,—

One of the most favorite remedies in England is the "Unguentum oxidi zinci benzoatum" of Erasmus Wilson, Bell's formula for which is as follows:

℞ Adipis præparati, ℥v;
Gummi benzoini pulveris, ℥i.

Liquefac, cum leni calore, per horas viginti quatuor, in vaso clauso; dein cola per linteum, et adde

Oxidi zinci purificati, ℥i.

Misce bene, et per linteum exprime.

To this a drachm of rectified spirit, spirit of camphor, or Price's glycerin may sometimes be added with advantage. The benzoin prevents the ointment from becoming rancid and irritating, while at the same time it imparts to it a certain fragrance. It is an excellent preparation, but, owing to the white crust which is apt to form, it is inferior to others when the eruption is situated upon uncovered or upon hairy parts. In such situations the zinc ointment of Dr. L. D. Bulkley, of New York, is preferable: it is composed of pure carbonate of zinc and the ceratum galeni, in the proportion of half a drachm to the ounce.

One of the most valuable of soothing ointments is the "Unguentum diachyli albi" of Hebra, of which the following is the formula:

℞ Olei olivæ, ℥xv;
Lithargyri, ℥iii et ℥vi.

Coque l. a. in ung. moll., dein adde
Ol. lavandulæ, ℥iii.

M Ft. unguentum.

This ointment is likewise unsuitable for hairy parts, on account of its matting the hairs together. More recently several varieties of soothing ointments containing oleic acid have come into use, one of the best of which is the "Unguentum zinci oleatis," recommended by Dr. Crocker, the formula for which is as follows:

℞ Zinci oxidi, ℥i;
Acidi oleici, ℥viii;
Vaselini, ℥ix.

Rub up the oxide of zinc with the oleic acid, and let it stand for two hours; then place in a water-bath until the zinc is dissolved, add the vaseline, and stir until cold. Instead of this Dr. Sawyer has more recently recommended an oleate of lead ointment, which is composed of lead oleate, twenty-four parts; heavy and inodorous paraffine oil, fourteen parts. The lead oleate is prepared by heating a mixture of oleic acid and oxide of lead, one part of the former to eight parts of the latter. It is prepared in the same way as the last ointment, but, in my experience, is inferior to it as a sedative application.

By far the best of all the soothing ointments with which I am acquainted—which was prepared at my suggestion by Messrs. Frazer & Green, chemists, Glasgow, and which is made in the same way as the oleate of zinc ointment—is composed of

℞ Bismuthi oxidi, ℥i;
Acidi oleici, ℥viii;
Ceræ albæ, ℥iii;
Vaselini, ℥ix;
Olei rosæ, ♏v.

I have not only used this ointment with the very best results myself, but those of my professional brethren to whom I have recommended it have professed themselves equally satisfied with it; and one medical man in particular recently informed me that it was the only ointment, of the many which he had tried, which had proved a sedative in his own case.

Instead of merely rubbing soothing ointments upon the inflamed surface, as is so often done, it is always preferable, when at all possible, to apply them spread thickly upon pieces of linen, which should not be too large, else they do not lie evenly upon the inflamed parts.

Boracic Acid in Skin Diseases.—Carbolic acid is doubtless of great value in the treatment of cutaneous affections, but it is a poisonous and irritant substance, especially in the case of young children. Boracic acid is an excellent antiseptic, is non-irritant, non-poisonous, and renders good service in the management of eczema, *e.g.*, in the form of ointment:

℞ Vaselini, ℥i;
Acid. boracic. (impalpable powder), ℈v;
Balsam. Peruvianæ, ℈i.—M.

Or, the boracic acid may first be dissolved in an equal weight of glycerin, and the other ingredients added.

Treatment of Ozæna.—Dr. Wolfrau employed twice a day, for five minutes at a time, aspirations of a solution of tannin and glycerin (two per cent.) preceded by irrigation of the nasal fossæ with one litre of a solution of sea-salt, in the case of a patient who had been affected with a muco-purulent fetid nasal discharge for a year. In a fortnight afterwards he tried a solution of acetate of alumina, at first one-half per cent. and then one per cent. Gradually the nasal secretion became less in quantity and fetidity, the number of irrigations was reduced, and the patient was cured in six weeks.—*Berlin. Klin. Wochenschr.; Specialist*, September 1, 1880.

Treatment of Herpes.—M. A. Fournier (*La France Médicale*) recommends, after washing the ulcerated vesicles of herpes with hypochlorite of soda solution diluted with half its volume of water, that the wound be covered with cotton wool impregnated with the following powder: subnitrate of bismuth, four parts; calomel and oxide of zinc, of each one part. If the eruption is extensive, he recommends absolute rest, the administration of baths with bran or starch, and the internal prescription of opium and bromide of potassium.

Pine-Wool Clothing. — Throughout France and Germany, says the *British Medical Journal*, a considerable reputation has been achieved by the product of the pine-wool fabrics of Remda, in Thuringia. The jerseys, drawers, and underclothing made of this product, woven into warm aromatic undergarments, are much worn, and have a considerable reputation for use as preventives of rheumatic affections, and for protecting the body against sudden changes of temperature in inclement weather.

Simple Method of Reducing Paraphimosis.—M. Bardinet employs the following with success. He inserts the convex ends of three hair-pins, at regular distances apart, beneath the constricting ring, and over the bridge thus formed the foreskin is drawn down with the greatest facility.—*Allg. Med. Cent. Zeit.*

MISCELLANY.

Characteristics of Chian Turpentine.—Prof. Clay contributes to the London *Lancet* the following interesting information regarding this new remedy:

"The pure drug is of such a solid nature that a portion taken between the fingers may be rolled into the form of a pill without adhering to the fingers: thus it is very different from the large number of spurious specimens which have been supplied to the public, and which for the most part have been of a syrupy consistence. The odor of the genuine drug is peculiar. If a portion be softened between the fingers the fragrant odor can be readily perceived, and it is not by any means similar to that of turpentine oil, whilst the spurious kinds smell strongly of the latter substance. The taste of the pure article is characteristic in not being unpleasant. Indeed, it is almost tasteless: I have kept a piece in my mouth for two hours and scarcely knew that it was there. The taste of most of the spurious kinds is very bitter, and so unpleasant that I now rarely adopt the above-mentioned mode of testing the drug. The brittle yet elastic nature of the pure drug is very striking. If a piece is warmed and rolled out, and is allowed to cool, and is then dropped on the floor, it generally breaks into a number of fragments. If a mass is placed in a shallow vessel it usually flattens and spreads over the vessel, the surface being smooth. When the pure drug is placed between two pieces of warmed glass its appearance corresponds exactly with that given in the Pharmacographia. It is best to take a piece of glass, warm it very slightly with a piece of lighted paper, clean it, and then place the drug to be examined upon it; then cover the drug with another piece of glass, and allow both to cool; then by holding the double glass up to the light the characters are readily distinguished. If the drug is spurious, consisting perhaps of strained crude turpentine or Venice turpentine, and so

placed between warm glass, it will present the appearance almost of water. If Chian turpentine is adulterated with Canada balsam, on a gentle heat being applied to the glass on which it has been laid, the Chian turpentine remains in the centre and the balsam flows over the glass, the reason being that the former requires a little stronger heat to liquefy it. If black resin is mixed with Venice turpentine to make the specimens resemble the impurities of the real article, the compound is of a syrupy consistence only, and on heating the mass sufficiently between two glasses the resin is melted, so that the apparent impurities which it presented disappear, while these remain permanent in the genuine drug. Canada balsam, when heated, becomes transparent, and perhaps more so if the heating is repeated, and the smell is of a well-marked sickly odor. If the spurious kind consists largely of resin, and a piece is put on a spatula and a lighted taper applied to it, the characteristic resinous odor is at once obtained.

"The taste, odor, and appearance, then, are the chief characteristics of the drug. If it has a bitter taste, it is not pure; if it has not much taste, as a mixture of resin and Canada balsam, on burning the mass the peculiar odor will reveal its impurity. If the mass does not dissolve in alcohol, but leaves a glutinous residue, then, all other things being equal, it is pure. If it is of a grayish-white or even black color, mixed with impurities, and of a syrupy consistence, it will have a strong smell of turpentine, and is not pure."

MALTINE IN PHTHISIS. By William Porter, A.M., M.D., St. Louis.—There is no complication of chronic disease more common than malnutrition; equally true is it that in such diseases no function demands more attention than the assimilation. After cod-liver oil was urged upon the English profession by Bennett, the proportion of deaths from phthisis to deaths from all causes was lowered from 16 per cent. for five years previous to 1841 to 10.4 per cent. for five years subsequent to 1860. (See Registrar-General's Report.) Dr. C. J. B. Williams (Lumleian Lectures, Lond. College of Physicians, 1862) observes "that the experience of Louis and Laennec gave an average of two years' life in phthisis after it was decidedly developed; but that since cod-liver oil was introduced, he infers from seven thousand cases that the average duration of life has been four years."

Phthisis is pre-eminently a wasting disease, and by exalting failing nutrition, cod-liver oil being little more than a given food, a great advance was made in therapeutics. It has been found, however, that the oil does not in many cases meet the indications; for not only is nourishment needed, but the digestive power is so reduced that but little use is made of the food that is taken. Hence a demand both for nutritious material and for something which will aid food suitable for assimilation. The clinical starting-point in the history of the greater number of cases of phthisis is malnutrition, and when that is guarded against much is accomplished.

After full trial of the different oils, and extract of malt preparations, in both hospital and private practice, I find Maltine most applicable to the largest number of patients, and superior to any remedy of its class. Theoretically we would expect this preparation, which has become PRACTICALLY OFFICINAL, to be of great value in chronic conditions of waste and malnutrition, especially as exemplified in phthisis. Being rich in *diastase*, *albuminoids*, and *phosphates*, according to careful analysis, it aids in digesting farinaceous food, while in itself it is a brain-, nerve-, and muscle-producer.

In practice this hypothesis is sustained. A female patient at St. Luke's Hospital, aged 35, with phthisis, signs of deposit in left upper lobe, losing flesh for six months, poor appetite, and night-sweats, began taking Maltine March 13, 1880. She now weighs one hundred and twenty-one pounds, eats well, has no night-sweats, and the evidences of local disease are much less marked.

Another case of phthisis: A gentleman from Alabama, with all the physical signs of phthisis, rapidly losing health and strength. His was the remarkable gain of ten pounds *from six weeks' use of Maltine.*

Seven pounds' increase in as many weeks is the record of a third patient, a lady of 41 years, who has had no other medication than the Maltine. In these and other cases the increase in strength and mental vigor is in proportion to the gain in weight.

These instances are sufficient for illustration, and are *duplicated many times in the experience of physicians everywhere.* There is a universal reluctance always to testify to results from medicinal preparations, but when, as in this case, the composition is fully known, and the profession invited to investigate the manner of preparing it, there is no reason why the remedy should not receive general approbation, provided it be worthy.—*Quarterly Epitome of Practical Medicine and Surgery, a supplement to Braithwaite's Retrospect.*

THE Chicago *Medical Review* says that "The medical schools of New York, Boston, and Philadelphia which stand aloof from the association of colleges, either by withdrawal from membership or in their failure to place themselves on record as being in harmony with its spirit of advance, occupy a ridiculous position when they impliedly say that the attempt is premature. The difference between these institutions and the Western and Southern members of the College Association is that the latter propose to require of their candidates for graduation not merely the 'evidence,' but three years of genuine study; while the former continue to require two short sessions of lectures, and to dispose of the remainder of the three years by simply re-

quiring 'evidence' of study." It thinks that, in the long run, low-grade schools in the East will scarcely make headway in face of the honest efforts for improvement now made in the West.

HEBRA'S PECULIARITIES.—It is said that, with all his popularity among his pupils and his colleagues, the late Professor Hebra was a thorough despot. He was termed, it is said, the "hospital pasha;" and by his rude language, indecent jokes, and arbitrary bearing he too often excited terror among patients and the more timid of his colleagues. English and American visitors who have been present at some of his clinical lectures have declared that scenes were witnessed and language heard which would not have been tolerated in any other hospital in the world. However, a great teacher he was, and his lectures were delivered in the most classical German.

M. MAURICE KOECHLIN, of Mulhouse, was recently graduated as a bachelor of arts at Rouen, at the age of sixteen years. The remarkable thing in the case is not alone the youth of the graduate, but the fact that he is a deaf-mute, having been born in that condition. His wonderful success, in spite of his great natural disadvantages, has created quite a sensation.

IMPACTED WATERMELON-SEEDS.—Dr. J. H. Stranger writes to the *New York Medical Record*, "On August 3 I removed a pint of watermelon-seeds from the rectum of a patient of mine. He had eaten the melons, seeds and all, and the seeds were so firmly impacted that they had to be removed under chloroform."

TREATMENT OF HYDRARTHROSIS.—Dr. Paquet reports twenty-two cases of hydrarthrosis of the knee-joint, subacute and chronic, treated by immobility and faradization, sixteen of which were cured permanently in from eight to twenty-five days.—*Le Progrès Médical.*

IT will be remembered that some time since Dr. S. P. Chalfant fatally shot Josiah S. Bacon in a quarrel growing out of the dental rubber suits. He has recently been convicted of manslaughter and sentenced to ten years' imprisonment.

ACCORDING to the New York *Medical Record*, registration under the new law has been very general on the part of the profession: two thousand two hundred and fifty is the number for New York City.

DR. WILMS, said to have been the greatest operating surgeon of Germany, and one of the luminaries of scientific and professional Berlin, died recently of blood-poisoning, contracted during an operation.

DR. VERNEUIL, Surgeon to La Pitié Hospital, and Dr. Charcot, Chief Physician of the Salpêtrière, have been made officers of the Legion of Honor.

IT is said that thymol has the property of immediately removing the smell of tobacco.

THE OYSTER.

O mollusk nutritious,
Bivalve delicious,
There's nothing pernicious
In thy succulent dish,
Thou dearly-loved fish!
Heightening our gayeties,
Sweetening asperities,
Softening austerities,
Stomachic, smoothing,
Toothsome and soothing.
However thou'rt galloped,
Stewed, roasted, or scalloped,
Raw, pickled, or fried,
Thou still art the pride
And Queen of the tide!

—*Cincinnati Lancet and Clinic.*

OFFICIAL LIST

OF CHANGES OF STATIONS AND DUTIES OF OFFICERS OF THE MEDICAL DEPARTMENT U.S. ARMY FROM OCTOBER 3 TO OCTOBER 16, 1880.

HAPPERSETT, J. C. G., MAJOR AND SURGEON.—Assigned to duty as Post-Surgeon at Fort Brown, Texas, to enable Assistant-Surgeon F. Meacham to comply with S. O. 190, c. s., A. G. O., in his case. S. O. 199, Department of Texas, September 29, 1880.

BREWER, J. W., CAPTAIN AND ASSISTANT-SURGEON.—Assigned to duty at McPherson Barracks, Atlanta, Ga. S. O. 117, Department of the South, October 7, 1880.

LIPPINCOTT, H., CAPTAIN AND ASSISTANT-SURGEON.—Granted leave of absence for six months. S. O. 218, A. G. O., October 12, 1880.

POPE, B. F., CAPTAIN AND ASSISTANT-SURGEON.—Having reported at these Headquarters, is assigned to duty at Fort Sully, D. T. S. O. 122, Department of Dakota, October 9, 1880.

DICKSON, J. M., CAPTAIN AND ASSISTANT-SURGEON.—Assigned to duty as Post-Surgeon at Vancouver Barracks, W. T. S. O. 171, Department of the Columbia, September 24, 1880.

CRONKHITE, H., CAPTAIN AND ASSISTANT-SURGEON.—Assigned to duty as Post-Surgeon at Camp Sheridan, Neb. S. O. 94, Department of the Platte, October 5, 1880.

HEITZMANN, CHARLES L., CAPTAIN AND ASSISTANT-SURGEON.—Granted leave of absence for one month, with permission to apply at Division Headquarters for an extension of one month, and to the Adjutant-General of the army for a further extension of two months. S. O. 170, Department of the Columbia, September 23, 1880. Leave of absence extended one month. S. O. 143, Division of the Pacific and Department of California. September 28, 1880.

WILSON, WILLIAM J., CAPTAIN AND ASSISTANT-SURGEON.—Having reported at these Headquarters, is assigned to duty at Fort Meade, D. T. S. O. 121, Department of Dakota, October 6, 1880.

WEISEL, D., CAPTAIN AND ASSISTANT-SURGEON.—Assigned to duty as Post-Surgeon at Fort Warren, Mass. S. O. 181, Department of the East, October 8, 1880.

MATTHEWS, W., CAPTAIN AND ASSISTANT-SURGEON.—Having reported at these Headquarters, is assigned to duty at the Cantonment on the Uncompahgre, Col. S. O. 223, Department of the Missouri, October 8, 1880.

SEMIG, B. G., CAPTAIN AND ASSISTANT-SURGEON, Fort Fred. Steele, Wyo. T.—Granted leave of absence for one month. S. O. 95, Department of the Platte, October 9, 1880.

PRICE, C. E., CAPTAIN AND ASSISTANT-SURGEON.—Assigned to duty as Post-Surgeon at Fort Niagara, N.Y. S. O. 175, Department of the East, September 30, 1880.

GRAY, WILLIAM W., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—When relieved by Assistant-Surgeon Dickson, to report to Commanding Officer, Fort Canby, W.T., for duty as Post-Surgeon. S. O. 171, c. s., Department of the Columbia.

GORGAS, W. C., FIRST-LIEUTENANT AND ASSISTANT-SURGEON.—Assigned to duty as Post-Surgeon at Fort McIntosh, Texas, to enable Assistant-Surgeon J. H. T. King to comply with S. O. 190, c. s., A. G. O., in his case. S. O. 199, c. s., Department of Texas.